NEC

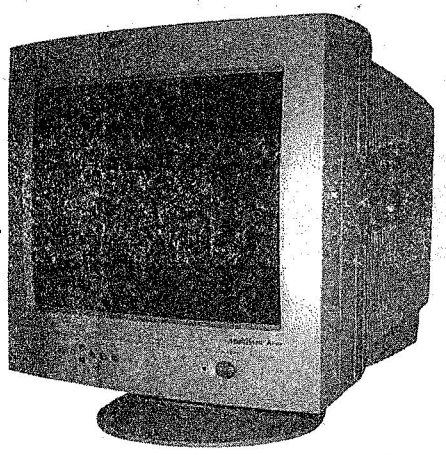
MODELS JC-1736VMA/B

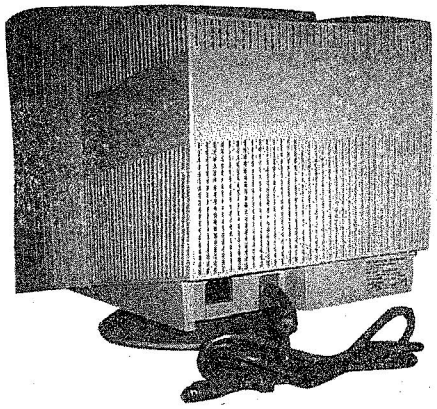
COLOR MONITOR **MultiSync® A700™**

SERVICE MANUAL

PART NO. 599910423

Better Service
Better Reputation
Better Profit





NEC Corporation
TOKYO, JAPAN

⚠ WARNING

The SERVICE PERSONNEL should have the appropriate technical training, knowledge and experience necessary to:

- Be familiar with specialized test equipment, and
- Be careful to follow all safety procedures associated with high voltage CRT circuit designs to minimize danger to themselves and their coworkers.

To avoid electrical shocks, this equipment should be used with an appropriate power code and be connected only to a properly grounded AC outlet.

This equipment utilized a micro-gap power switch. Turn off the set by first pushing the front panel power switch. Next, remove the power cord from the AC outlet.

To prevent fire or shock hazards, do not expose this unit to rain or moisture.

This symbol warns the personnel that un-insulated voltage within the unit may have sufficient magnitude to cause electric shock.

This symbol alerts the personnel that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

PRODUCT SAFETY CAUTION

1. When parts replacement is required for servicing, always use the manufacturer's specified replacement.
2. Comply with all caution and safety-related notes on the product display chassis and picture tube.
3. When replacing the component, always be certain that all the components are put back in the place.
4. When servicing display monitor unit, it is required that the provided lead dress is used in the high voltage circuit area.
5. It is also recommended that shatter proof goggles are worn, when removing installing and handling the picture tube. People not equipped with the proper precautionary measures mentioned should keep the picture tube away from body while handling.
6. As for a connector, pick and extract housing with fingers properly since a disconnection and improper contacts may occur, when wires of the connector are led.
7. Use a proper screwdriver. If you use screwdriver that does not fit, you may damage the screws.
8. X-radiation precaution

   This product contains critical electrical and mechanical parts essential for X-ray protection. Normal anode voltage is 25.0 kV at zero beam picture tube current under AC 100-120 V (A ver) / AC 220-240 V (B ver) input, and anode voltage must not exceed the voltages shown below under any operation condition. To measure anode voltage set brightness for very dim picture, and use a high impedance volt meter between chassis and anode lead and measure high voltage. If high voltage exceeds the specifications on the chassis schematic diagram, take the necessary corrective action.

Table MAXIMUM ANODE VOLTAGE

beam current	at 0 mA	at 0.5 mA	at 1.0 mA
A ver / B ver	32.3 kV	31.4 kV	31.0 kV

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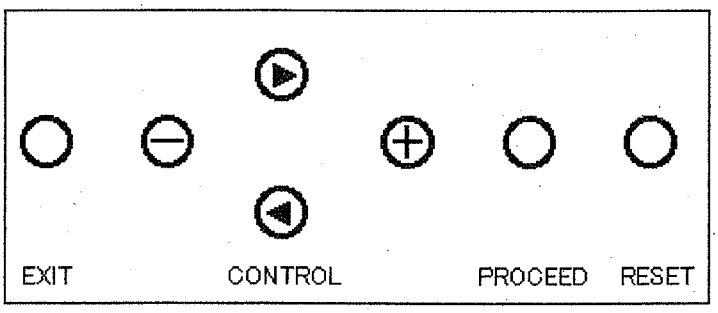
SPECIFICATIONS

Monitor Specifications	MultiSync A700™ Monitor	Notes
Picture Tube Diagonal: Viewable: Image Size: Radius:	17 inch 15.6 inch 1210 mm	90° deflection, 0.28 mm trio dot pitch, medium-short persistence phosphor, multi-layered, anti-static screen coating, semi-tint screen, Invar Shadow Mask and OptiClear screen.
Input Signal Video: Sync:	ANALOG 0.7Vp-p/75 Ohms Separate sync. TTL Level Horizontal sync. Positive/Negative Vertical sync. Positive/Negative Composite sync. (Positive/Negative) (TTL Level)	
Display Colors Analog input:	Unlimited number of Colors	Depends on display card used.
Synchronization Horizontal: Range Vertical:	31 kHz to 69 kHz 55 Hz to 120 Hz	Automatically Automatically
Resolutions Supported Resolution based on horizontal and vertical frequencies only	640 x 480 @ 60 to 120 Hz 800 x 600 @ 55 to 109 Hz 832 x 624 @ 55 to 103 Hz 1024 x 768 @ 55 to 85 Hz 1152 x 870 @ 55 to 75 Hz 1280 x 1024 @ 55 to 65 Hz	Some systems may not support all modes listed. NEC cites recommended resolution at 75 Hz for optimal display performance.
Active Display Area (Factory Setting) Horizontal: Vertical:	306 mm/12 inches 230 mm/9.1 inches	Dependent upon signal timing used, and does not include border area.
Active Display Area (Full Scan)	316 mm/12.4 inches 237 mm/9.3 inches	Dependent upon signal timing used, and does not include border area.
Power Supply	AC 100 - 120V, 50/60Hz (A ver) AC 220 - 240V, 50/60Hz (B ver)	
Current Rating	1.4 A @ 100 - 120 V (A ver) 1.0 A @ 220 - 240 V (B ver)	
Dimensions	403 mm (W) x 427 mm (H) x 440 mm (D) 15.9 inches (W) x 16.8 inches (H) x 17.3 inches (D)	
Weight	18.5 kg 40.8 lbs	
Environmental Considerations Operating Temperature: Humidity: Feet: Storage Temperature: Humidity: Feet:	 0° C to + 35° C 30% to 80% 0 to 10,000 Feet -20° C to + 60° C 10% to 90% 0 to 45,000 Feet	

NOTE: Technical specifications are subject to change without notice.

CONTROLS



OSM (ON-Screen Manager) control buttons on the front of the monitor function as follows:

EXIT Exits the OSM Controls.

CONTROL ◀ / ▶ Moves the highlighted area left/right to select one of the controls.

CONTROL +/− Moves the bar in the + or - direction to increase or decrease the adjustment.

PROCEED Enters OSM menu and selects icons at the top of the menu.

RESET Resets the highlighted control to the factory setting.

Brightness/Contrast Controls

Adjusts the overall image and background screen brightness.

Adjusts the image brightness in relation to the background.

Size and Position Controls

Moves the image horizontally (left or right).

Moves the image vertically (up or down).

Increases or decreases the horizontal size of the image.

Increases or decreases the vertical size of the image.

Geometry Controls

The **Geometry** controls allow you to adjust the curvature or angle of the sides of your display.

increases or decreases the curvature of the sides either inward or outward.

increases or decreases the curvature of the sides either to the left or right.

increases or decreases the tilt of the sides either to the left or right.

increases or decreases the top of the screen to be the same as the bottom.

RGB Color Control/AccuColor Control System

Two color presets select the desired color setting. Each color setting is adjusted at the factory to the stated degree Kelvin.

R, G, B: NEC's AccuColor Control System increases or decreases the monitor's red, green or blue color guns depending upon which is selected.

The change in color guns will appear on screen and the direction (increase or decrease) will be shown by the bars.

Tools

Degauss Control: Eliminates the buildup of stray magnetic fields that alter the correct scan of the electron beams and affect the purity of the screen colors, focus and convergence. When activated, your screen image will jump and waver a bit as the screen is demagnetized.
Caution : Please allow a minimum of 20 minutes to elapse between uses of the Degauss Control.

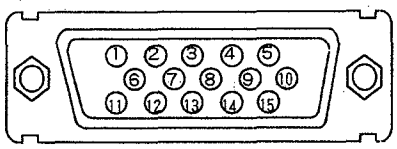
Indicates the frequency setting of the monitor.

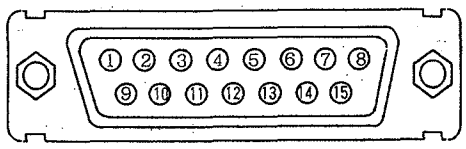
IPM System: On: The IPM System works normally and all stages of energy savings are utilized.
Off: The Off Mode of the IPM System is not used.

NOTE: For standard systems and graphics boards, keep the factory setting at **ON**.

ALL RESET Selecting **ALL RESET** allows you to reset all OSM control settings back to the factory settings **except IPM System**. Individual settings can be reset by highlighting the control to be reset and pressing the **RESET** button.

PIN ASSIGNMENT TABLE

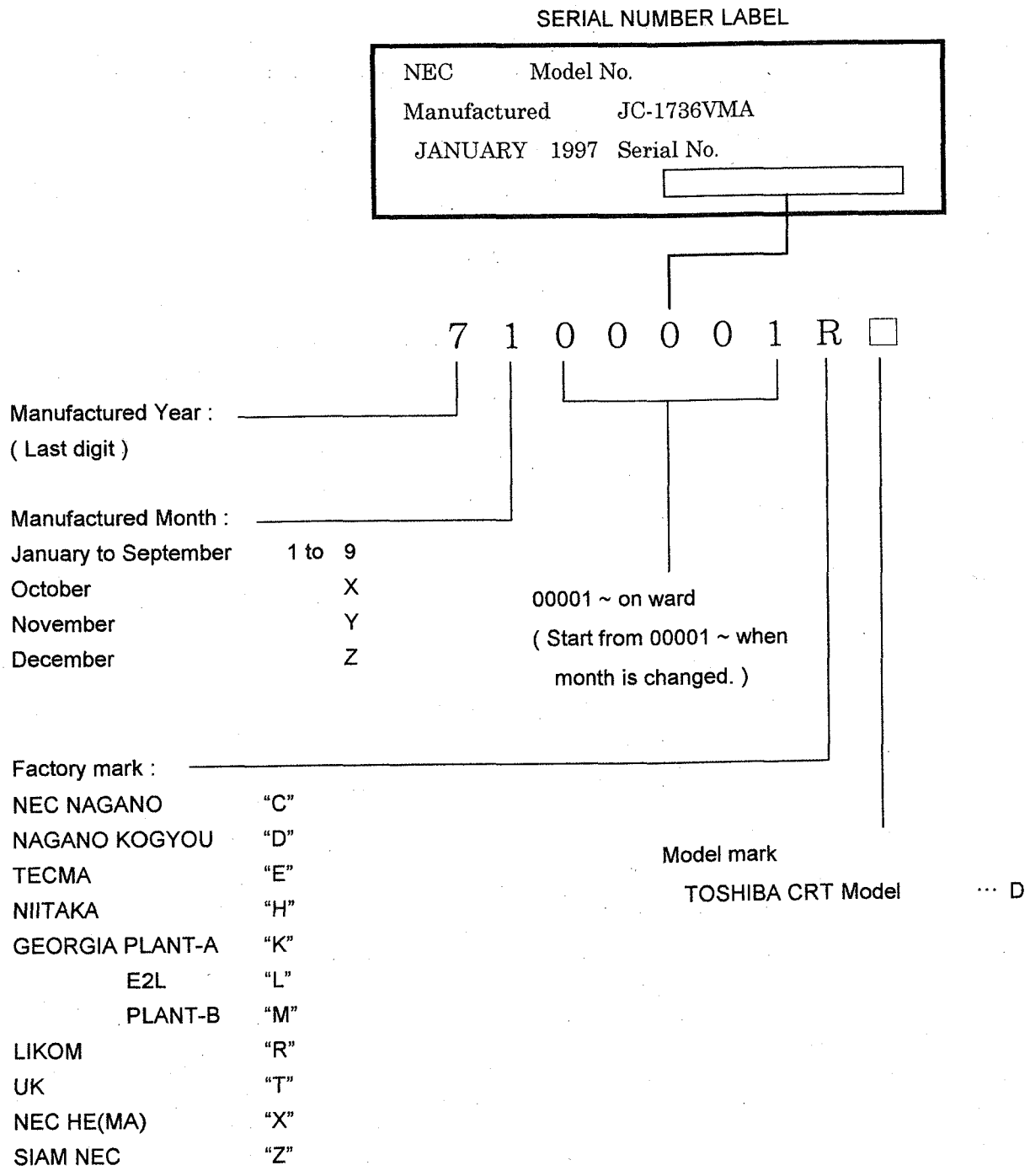




Pin No.	VGA/8514/A Mini D-SUB-15P	Macintosh Ⅱ with Adapter D-SUB-15P
1	RED	GROUND
2	GREEN	RED
3	BLUE	H/V COMP. SYNC.
4	GROUND	SENSE 0
5	GROUND	GREEN
6	GROUND	GROUND
7	GROUND	SENSE 1
8	GROUND	NC
9	NC	BLUE
10	GROUND	SENSE 2
11	GROUND	GROUND
12	DDC DATA	NC
13	H. SYNC., COMP. SYNC.	GROUND
14	V. SYNC.	GROUND
15	DDC CLOCK	NC

SERIAL NUMBER INFORMATION

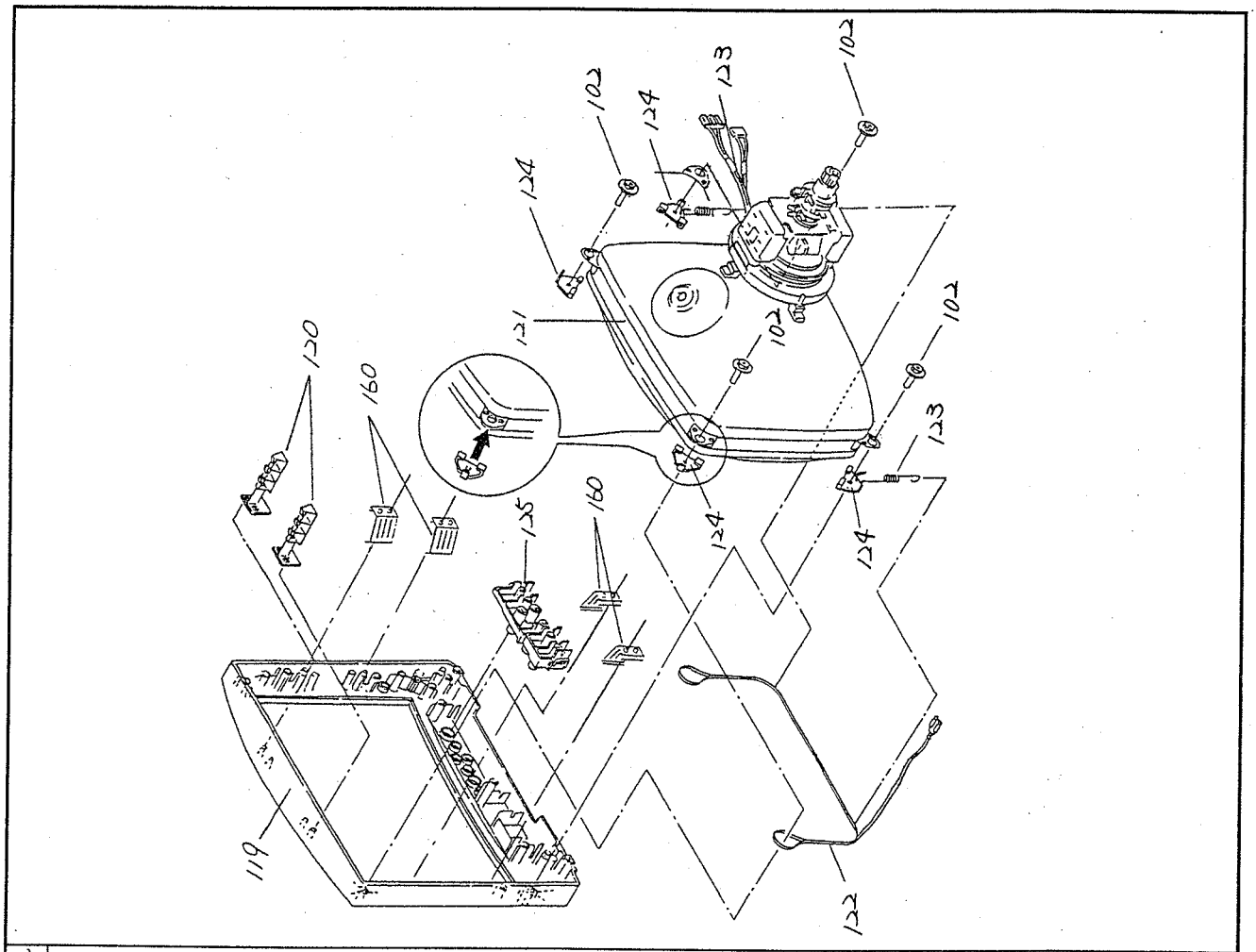
Refer to the serial number information shown below.



Note : Model JC-1736VMB complies with the above.

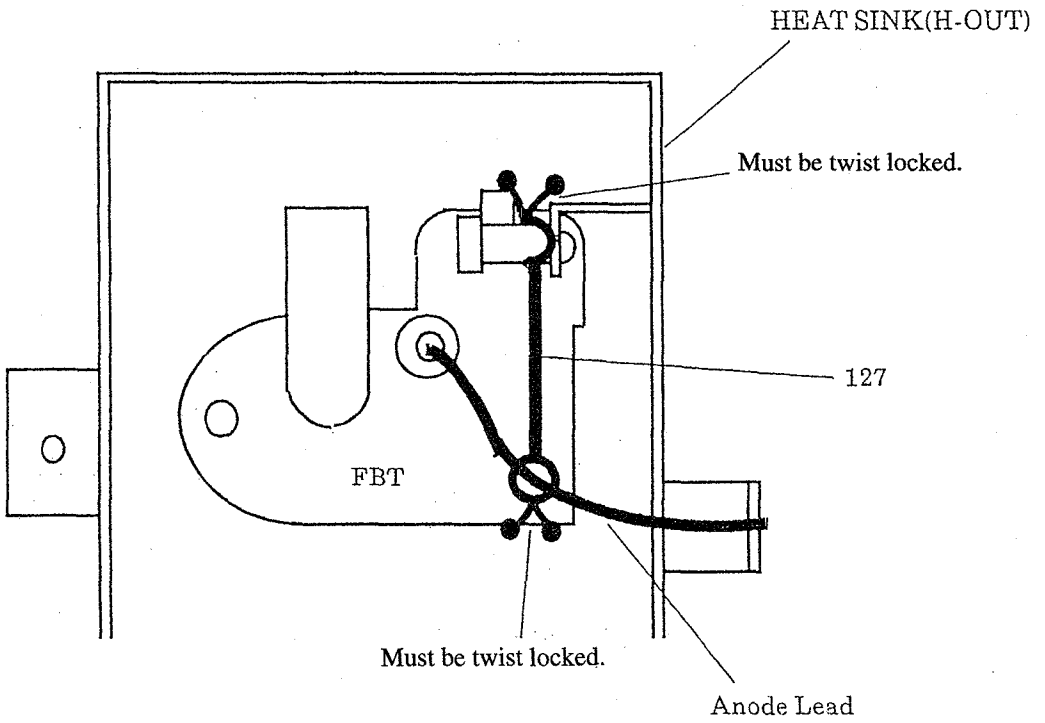
ASSEMBLY

- Before you disassemble the set, turn off power it and pull out the power plug.
- Use the proper screwdriver. If oversize or undersize screwdriver is used, screws may be damaged.
- Disassembly is the opposite process of assembly.
- Carefully discharge the CRT anode potential by grounding to coating dag before removing Anode Cap.

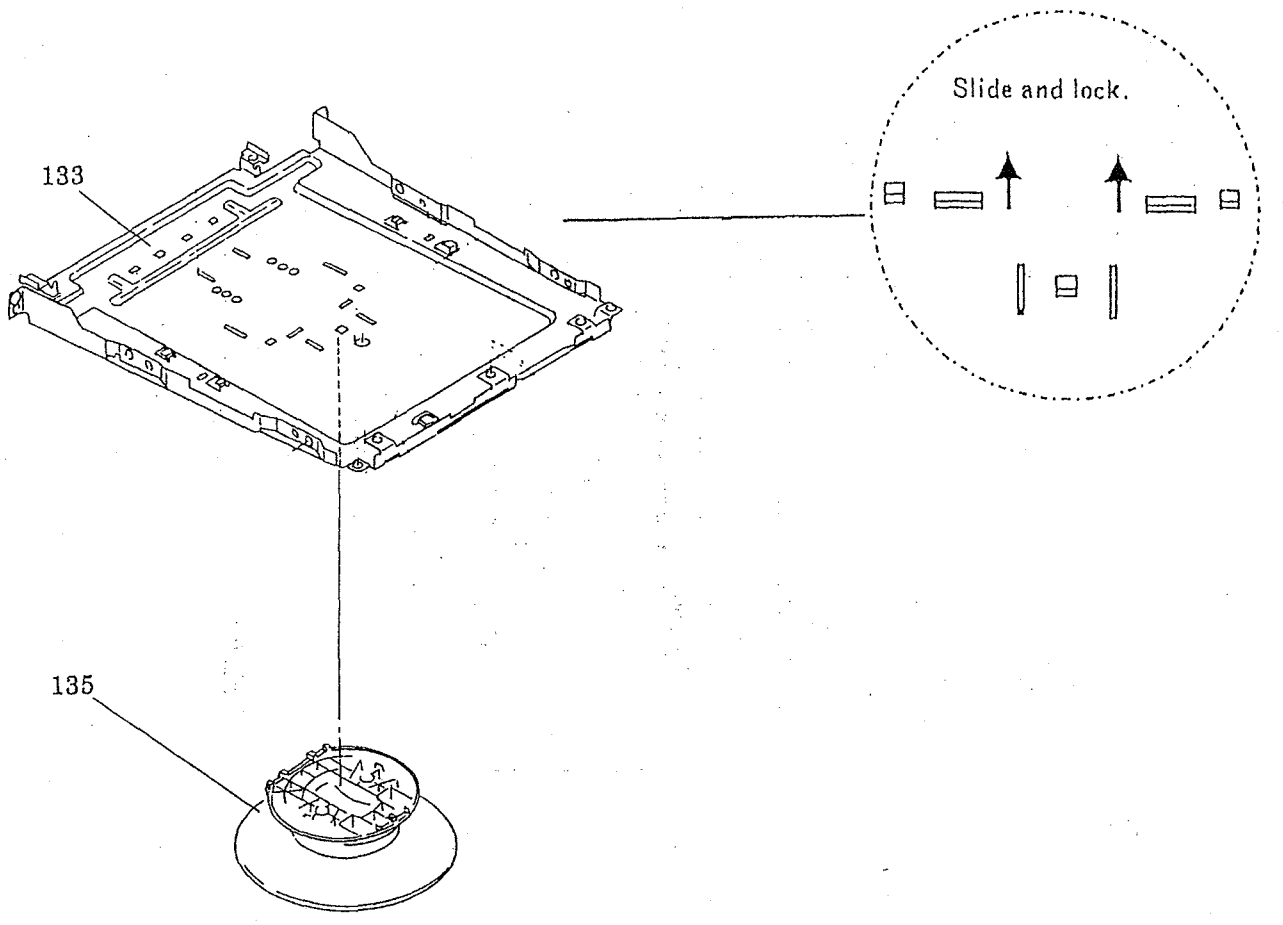


SYMBOL	REMARK
123	COIL SPRING insert to hole inside SPECIAL WASHER.

REMARK	SYMBOL	
Clamp the Anode Lead and FBT.	127	SAFETY

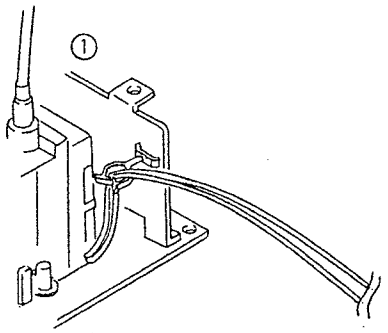


REMARK	SYMBOL
Mount the REVOLVING STAND ASSY to the CHASSIS BASE.	133 135 (135A) (135B) (135C)



REMARK	SYMBOL
Clamp SCREEN and FOCUS Leads.	①
	③
Clamp the CNSY, CN-M, CN-S and CN-B leads.	※ 1
Clamp the CNSY, CN-M, CN-S and CN-B leads.	※ 2
Tie up the CN-M and CN-S on the IC801.	※ 3
Clamp the DEGAUSSING COIL, JJA and JJB	※ 4

①



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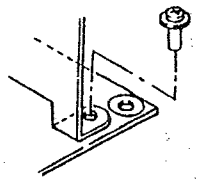

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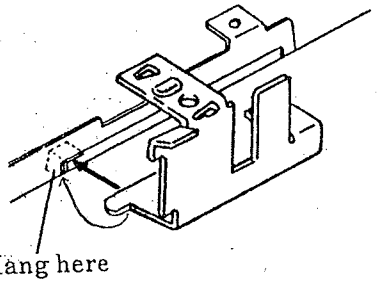

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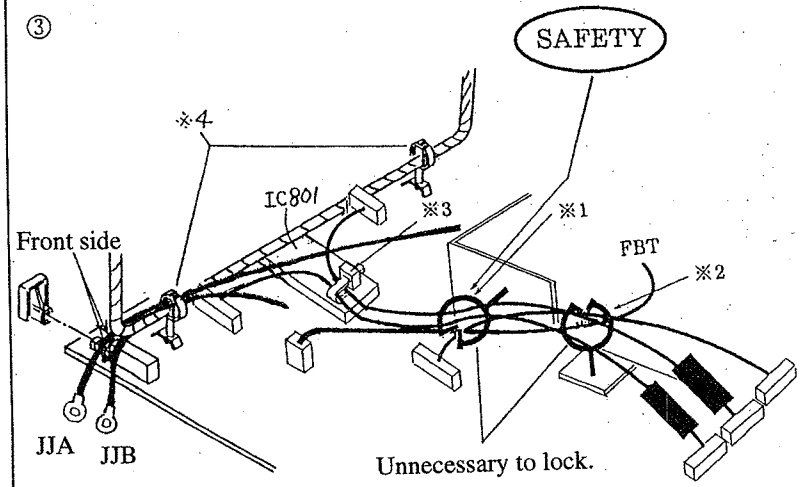
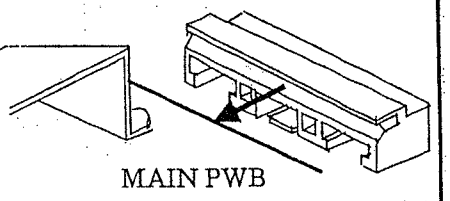
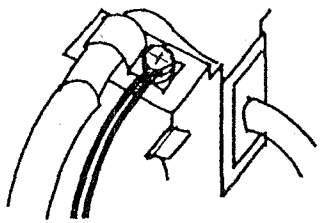
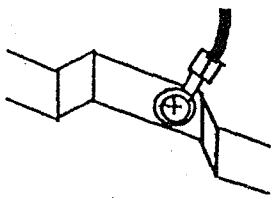
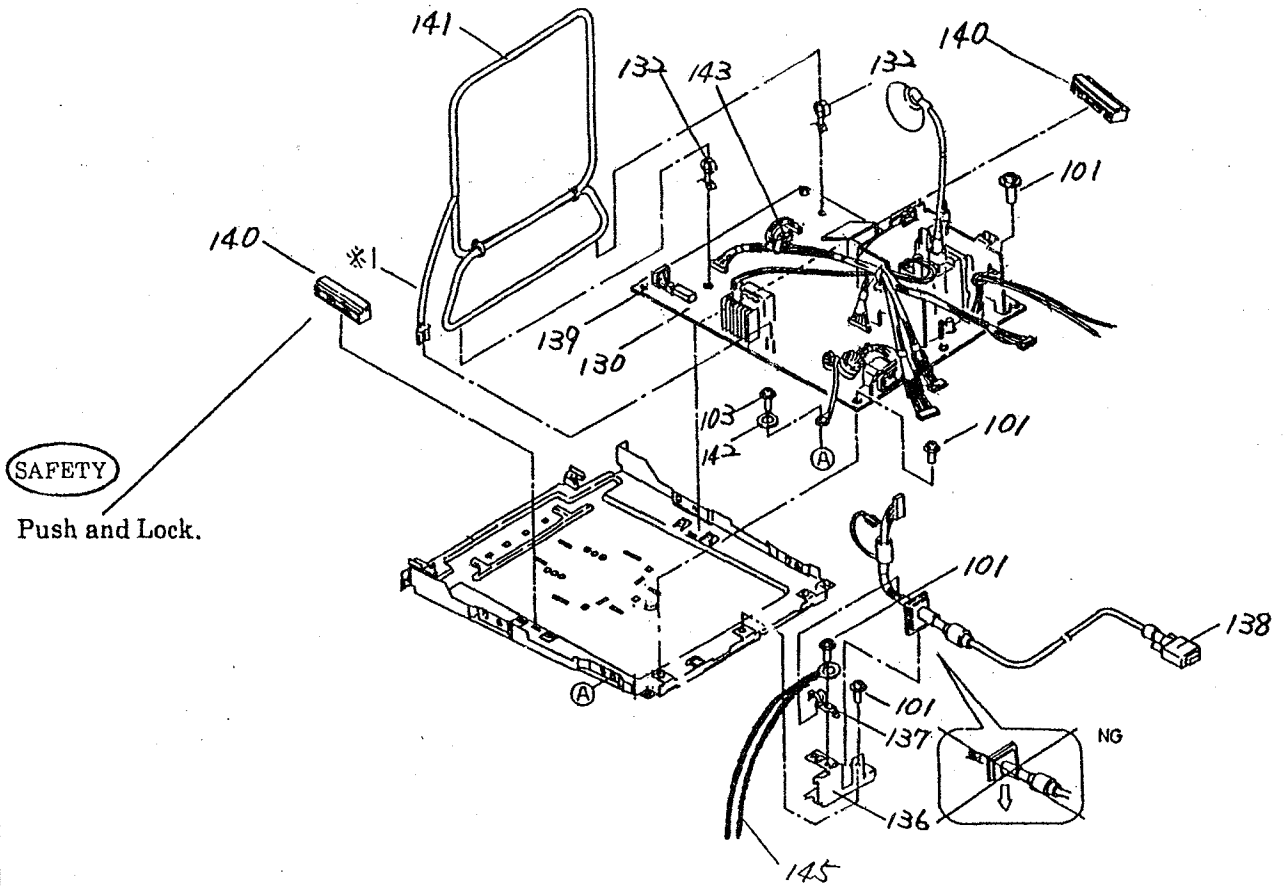


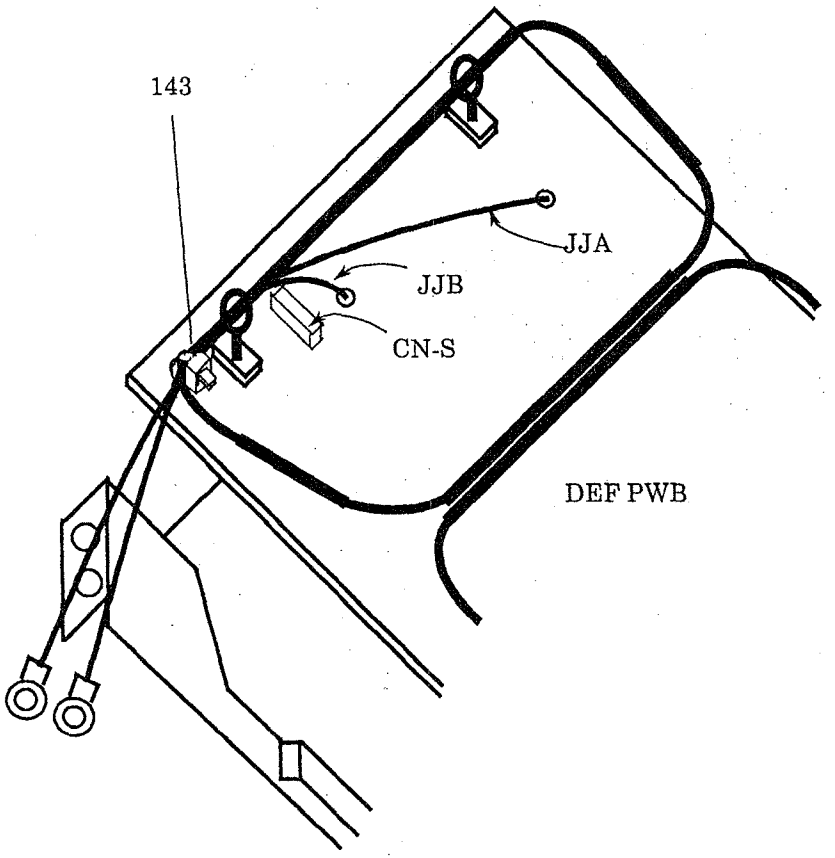
⑤



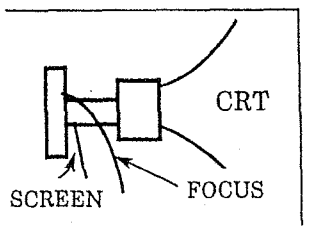
REMARK	SYMBOL
Screw the JJ711 on the BRACKET (SIG). 	
Screw the safety ground terminal to the CHASSIS BASE 	
Insert to CNZ to the MAIN PWB.	
Mount the MAIN PWB on the CHASSIS BASE.	

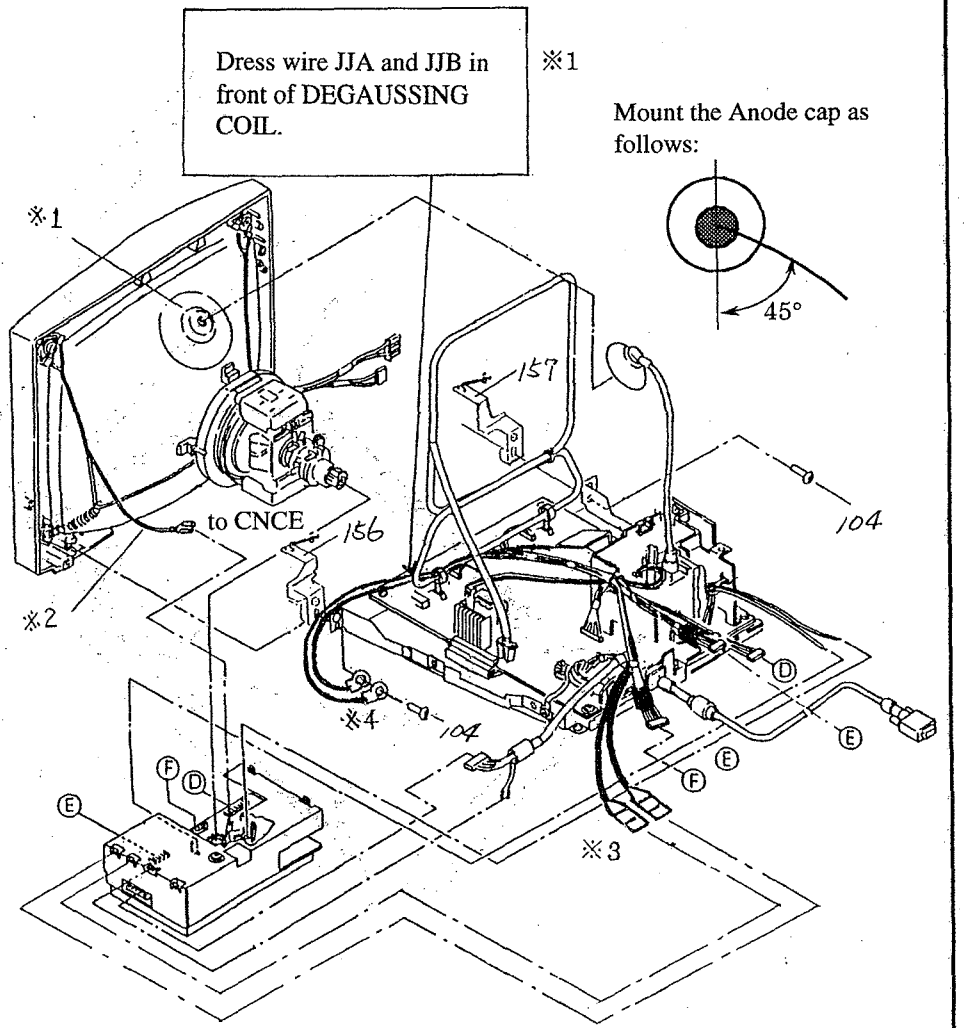


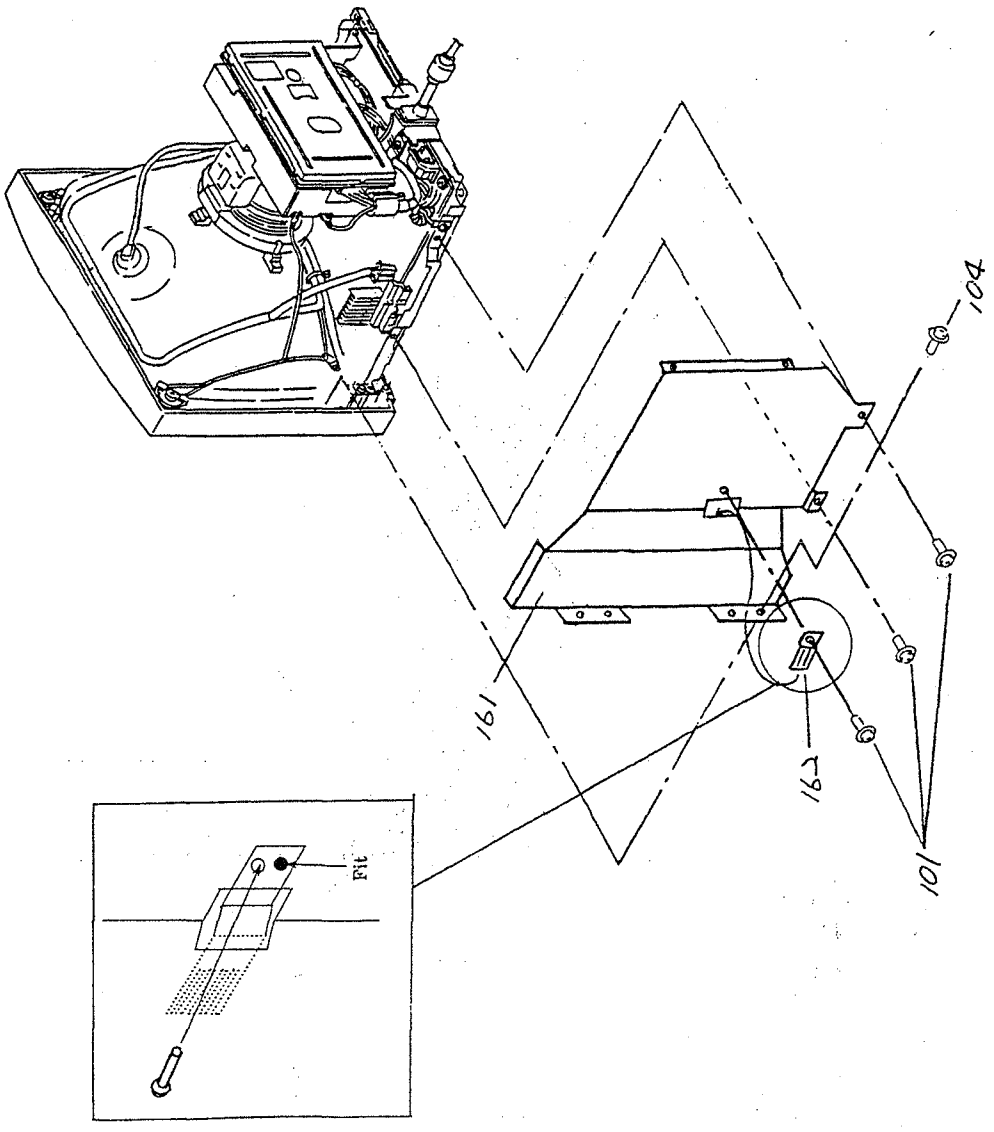
REMARK	SYMBOL
Tie up the JJA and JJB with the DEGAUSSING COIL.	143



REMARK	SYMBOL
Insert the CN-S, CN-M, CN-B to the CRT PWB.	
Insert the SIGNAL CABLE to the CRT PWB and PLATE, SHIELDING (CRT, F) ASSY. Insert the CNCE to the CRT PWB.	※2
Insert the JJ711 to the PLATE, SHIELDING (CRT, F) ASSY.	※3
Insert the CRT socket on the CRT PWB to CRT.	
Screw the LEAF SPRING with CHASSIS BASE and JJA and JJB to the CABINET FRONT ASSY.	※4



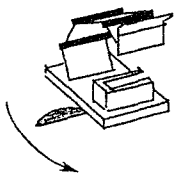




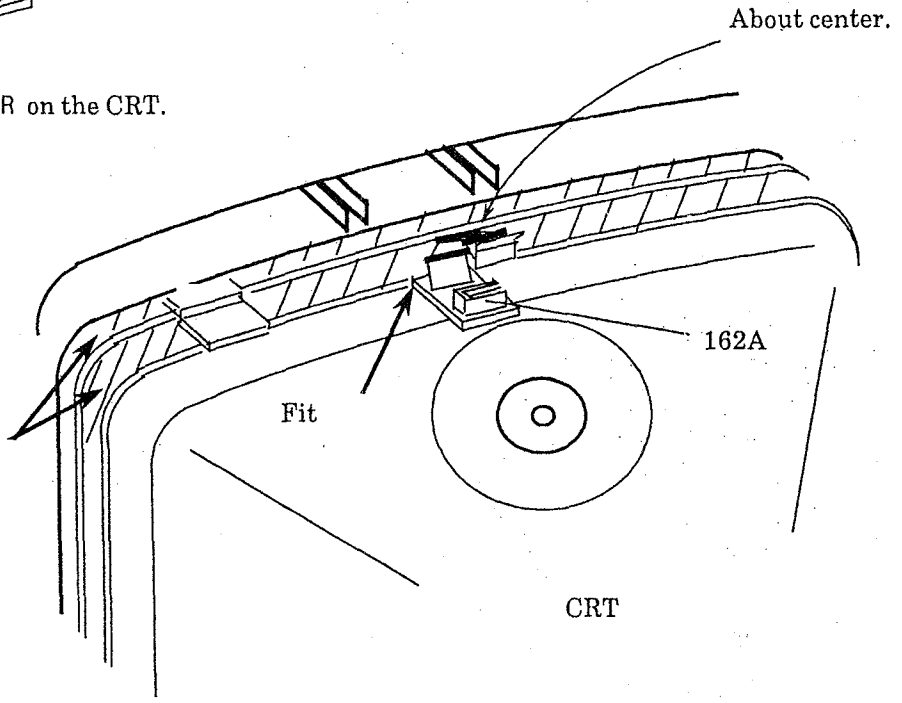
SYMBOL	
REMARK	

REMARK	SYMBOL
Attach the HOLDER on the CRT.	162A

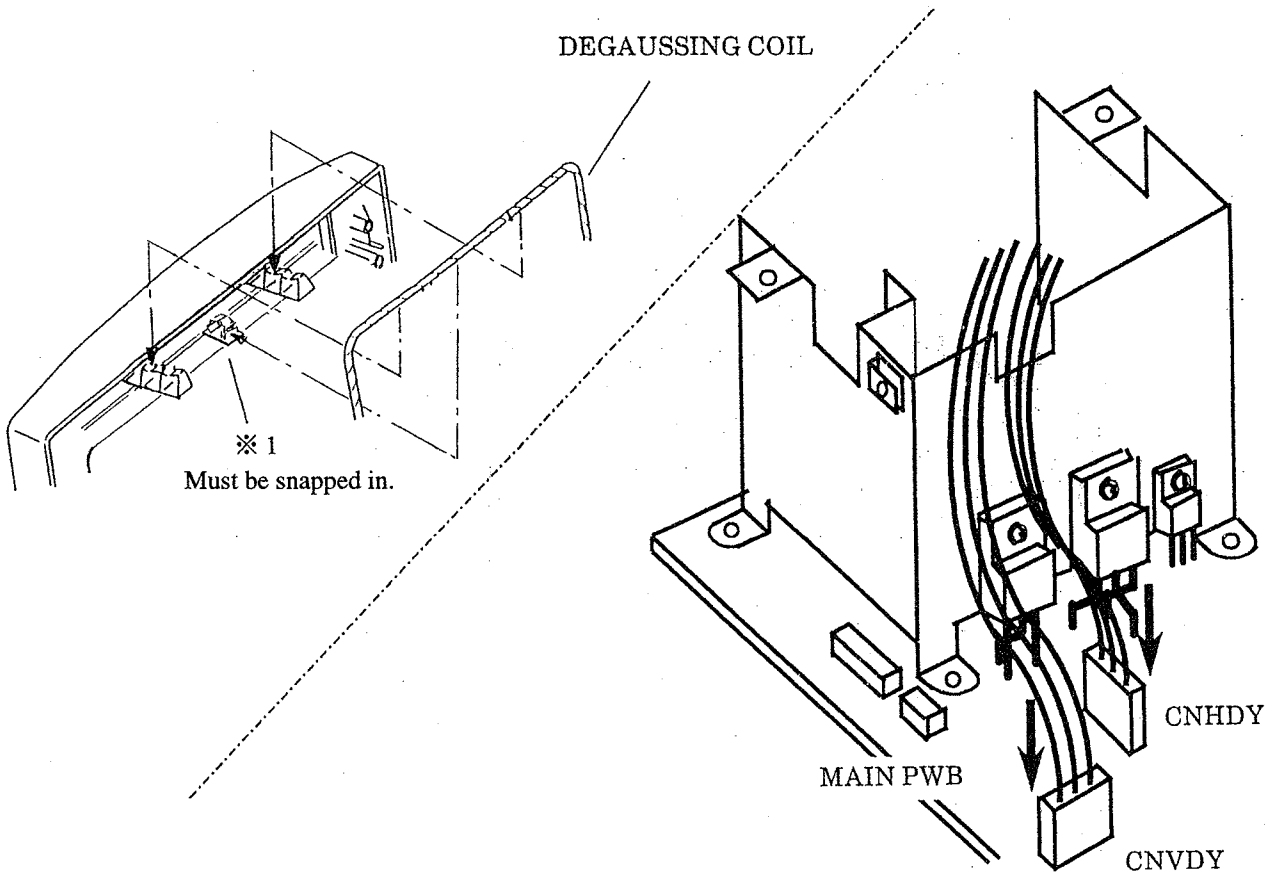
1.Peel off the sheet.

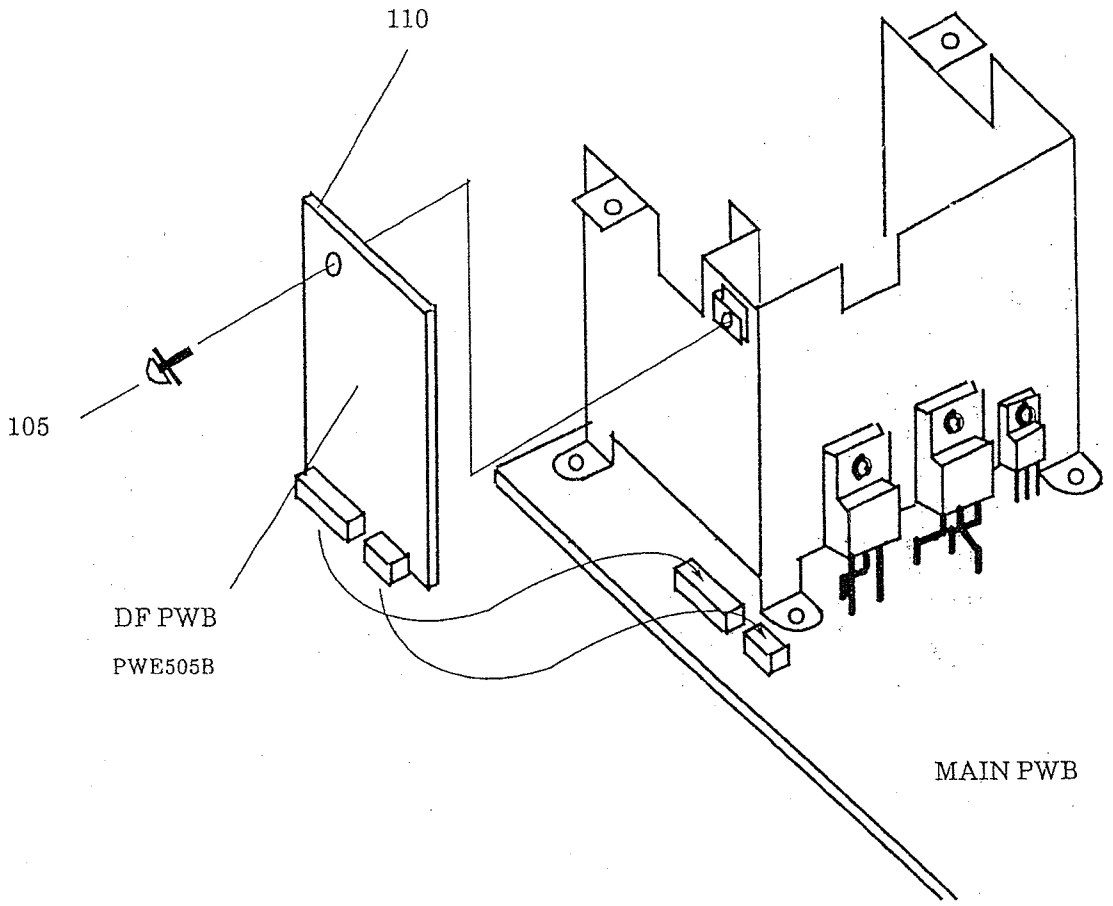


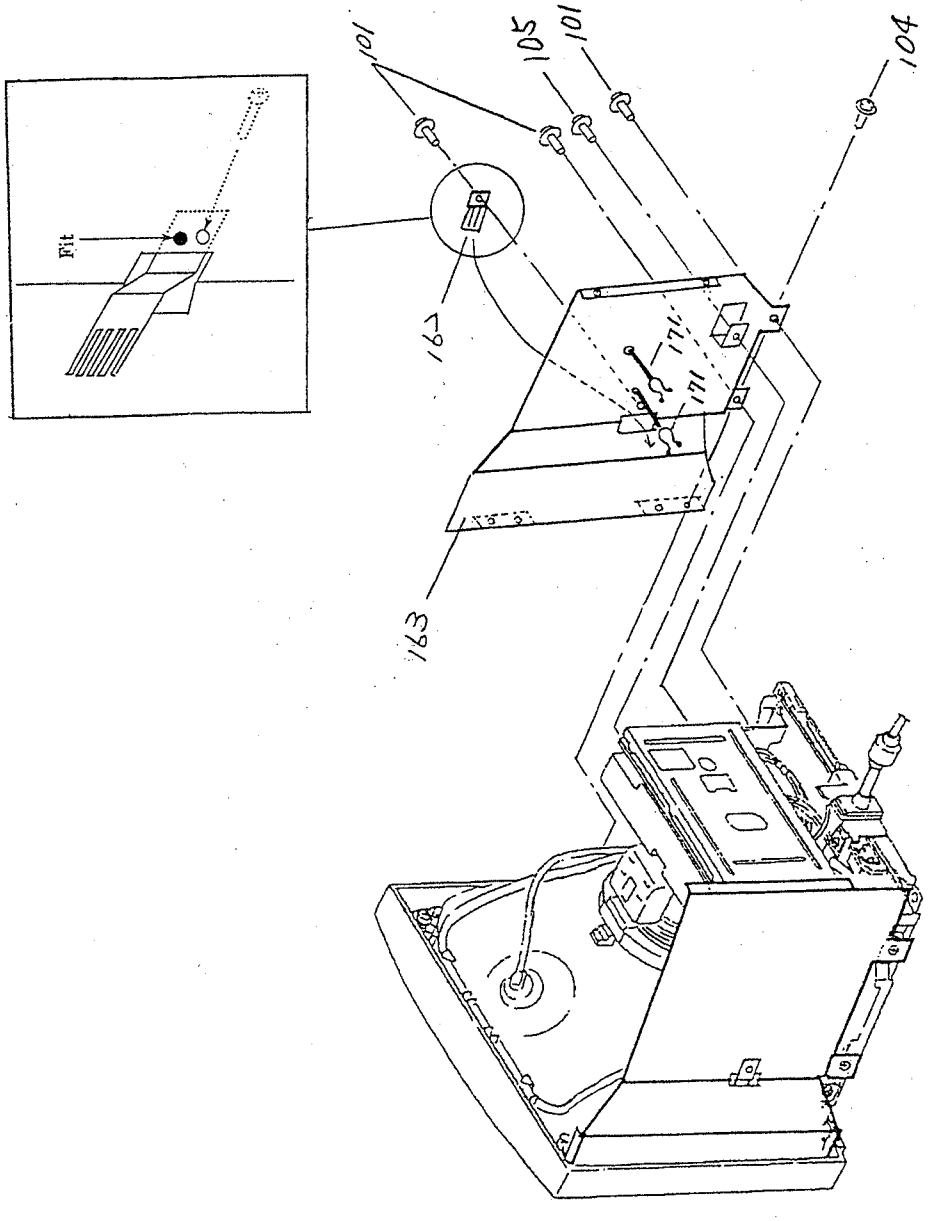
2.Attach the HOLDER on the CRT.



REMARK	SYMBOL
Hang the DEGAUSSING COIL on the DEGAUSSING COIL HOLDER. ※ Use the center holder. Clamp the DEGAUSSING COIL with HOLDER.	※ 1
Insert the CNVDY and CNHDY on the MAIN PWB.	

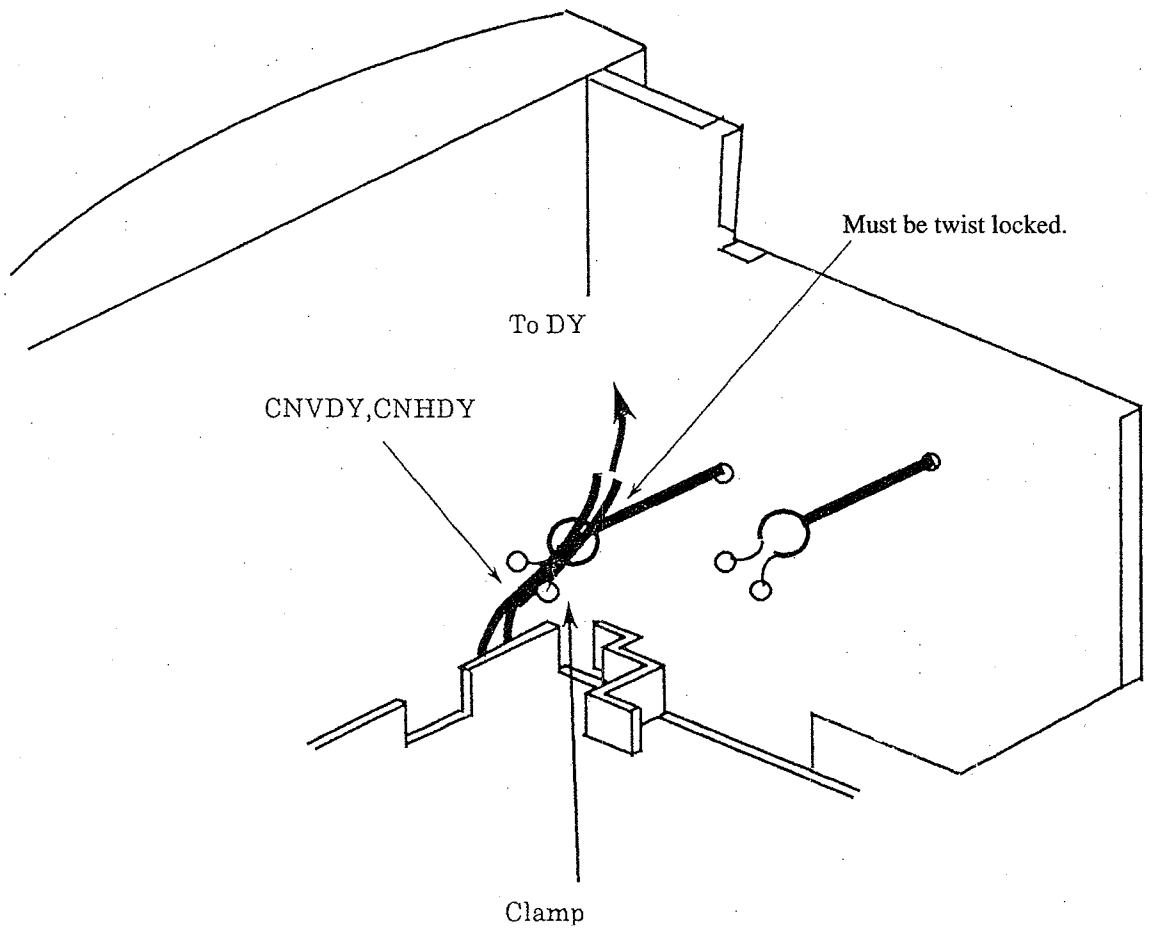


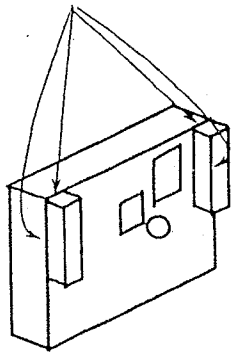
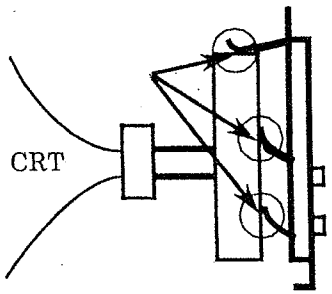
REMARK	SYMBOL	
		

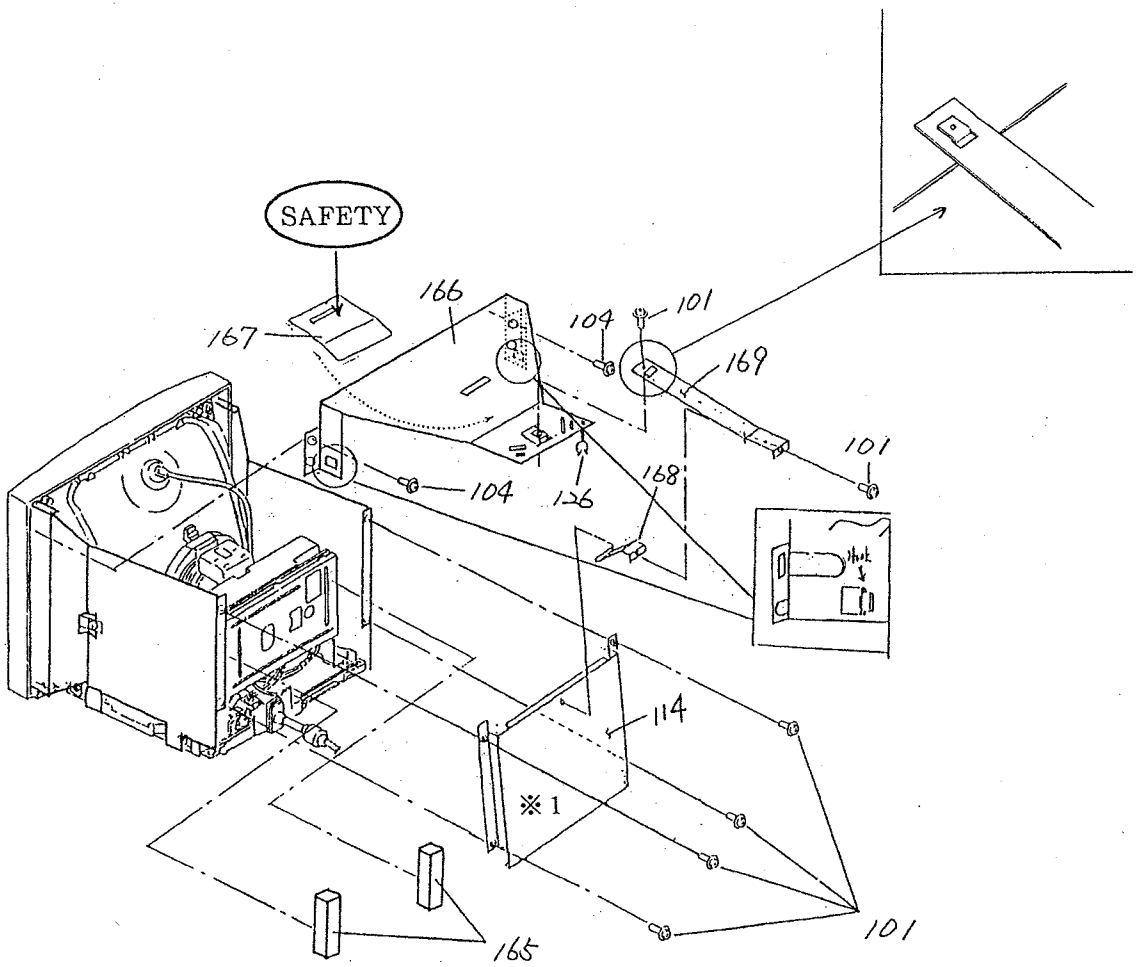


SYMBOL	
REMARK	

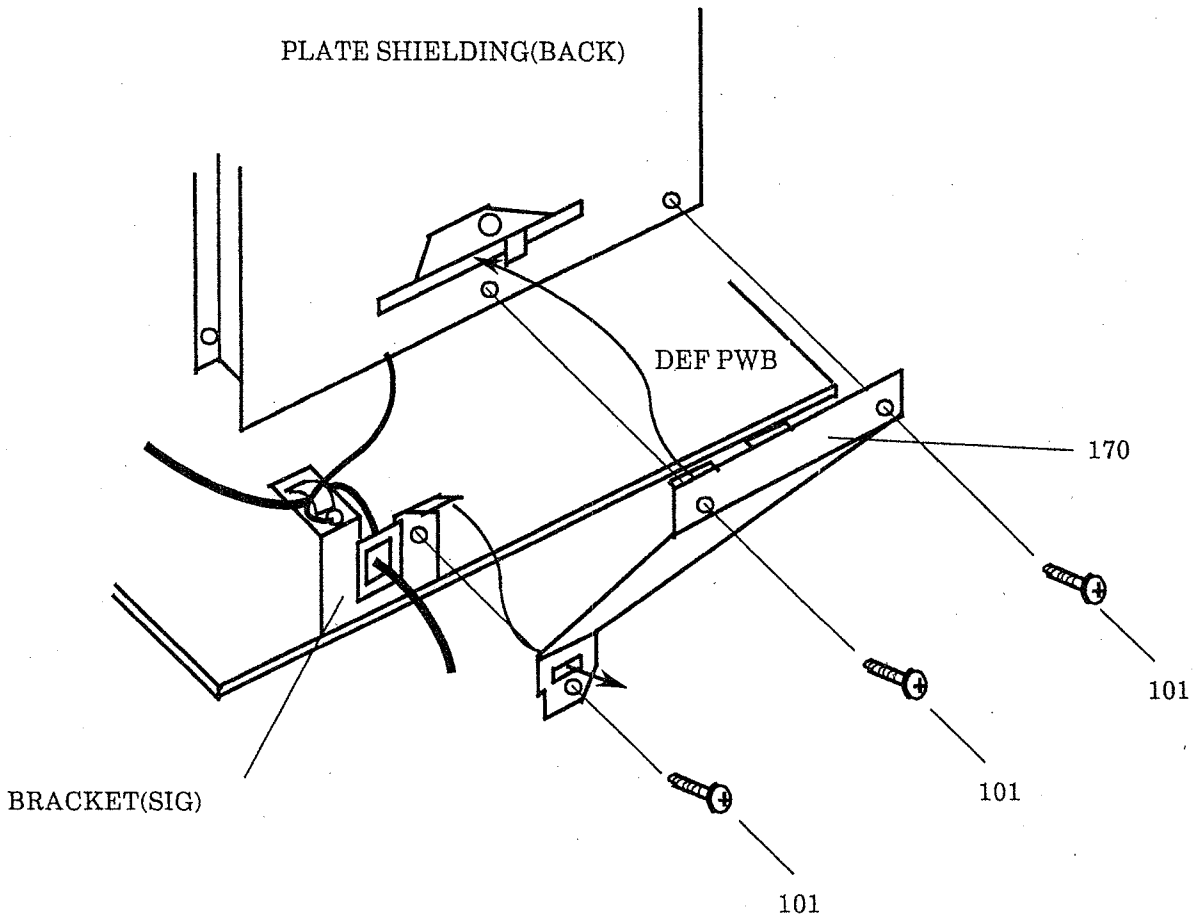
REMARK	SYMBOL
Clamp the leads of CNVDY and CNHDY.	



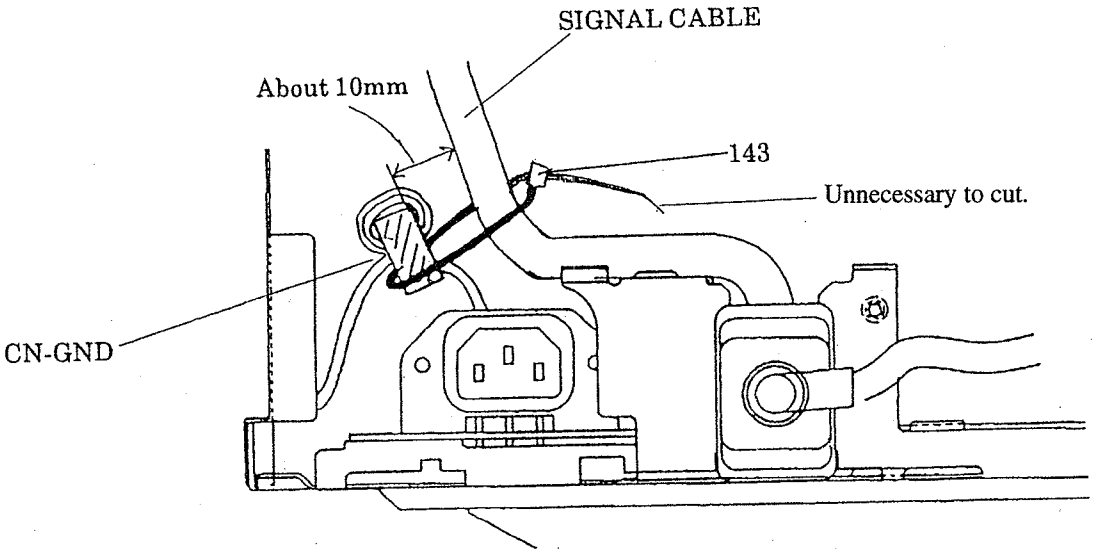
REMARK	SYMBOL
Fit the outward. 	165
LEFT SPRING (CRT, B), LEFT SPRING (VIDEO, A) and LEFT SPRING (CRT, F) must contact. 	※1

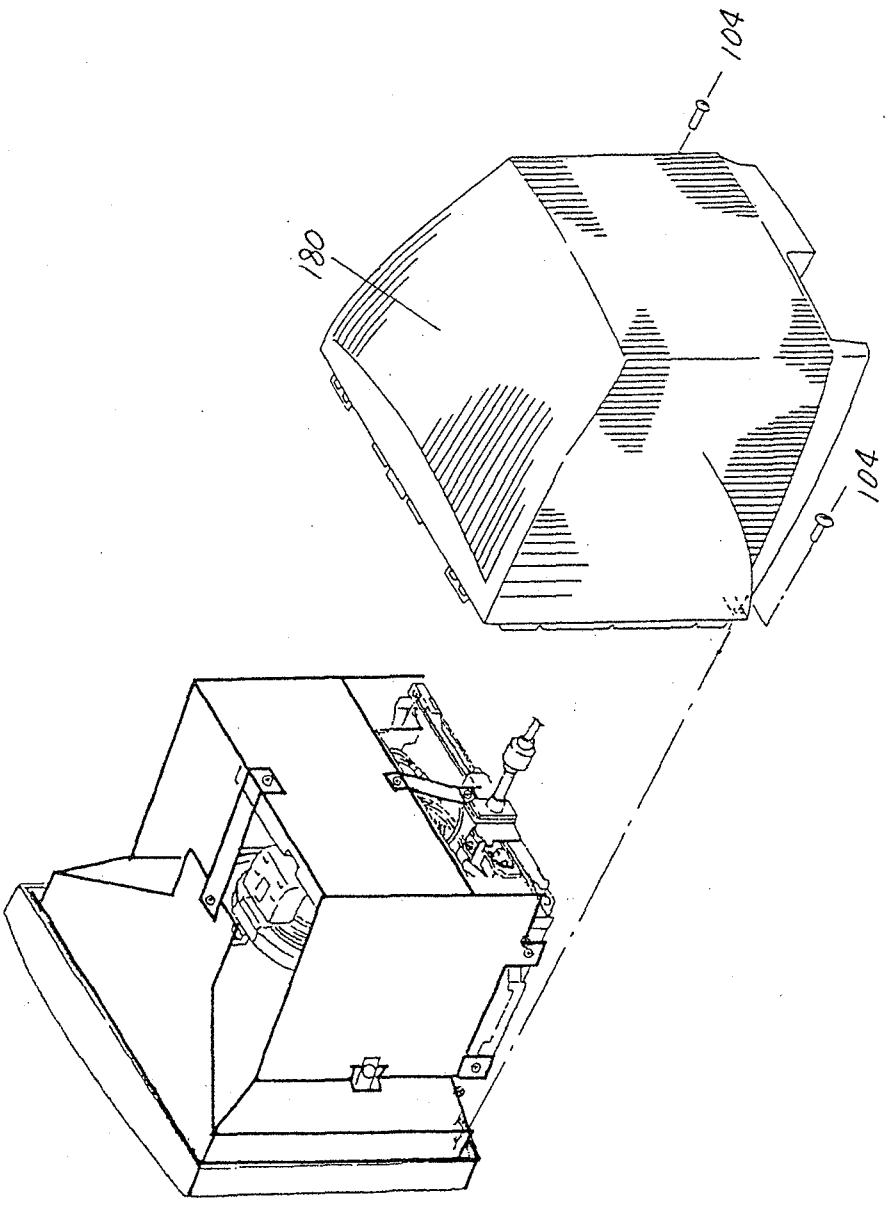


REMARK	SYMBOL	



REMARK	SYMBOL
Tie up the CN-GND and SIGNAL CABLE.	143





SYMBOL	
REMARK	

ADJUSTMENT PROCEDURES

1. Application

These specifications outline the adjustment procedures for Models JC-1736VMA/B 17 inch color monitor.

Model Name: JC-1736VMA/B
Destination: North America, Europe and Asia Standard Adjustment Conditions

2. Standard Adjustment Conditions

2-1. Power Supply Voltage

JC-1736VMA : AC 120 V±5% 60Hz
JC-1736VMB : AC 220 V±5% 50Hz

2-2. Warm Up

Adjust this monitor after a minimum of thirty minutes to allow unit to reach ambient operating temperature.

※ Do not extend a picture beyond fullscan concerning backraster and displayed picture during warm-up. Switch SW582 and adjust VR582 when horizontal position of displayed picture is off to one side.

2-3. Signals

Video : Analog 0.7±0.01 Vp-p Positive (terminated at 75 ohms ±1%)
or
Analog sync on green
Video 0.7±0.01 Vp-p positive
Sync 0.3±0.01 Vp-p negative (terminated at 75 ohms ±1%)

Sync : TTL level
H/V separate, positive / negative
or H/V composite, positive / negative
or sync on green, 0.3±0.01 Vp-p negative (terminated at 75 ohms ±1%)

2-4. Magnetic Fields

	Vertical Magnetic Fields	Horizontal Magnetic Fields
A / B Version	35±1 μ T	30±1 μ T

* Unless instructed otherwise, the CRT face should be facing to the east.
* Degauss the entire unit with an external degaussing coil for the adjustment.

2-5. Adjustment equipment

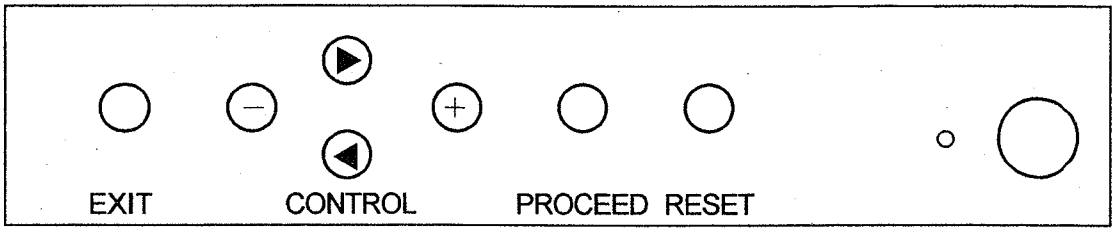
Signal Generator :
LVG-1603 is recommended for signal generator.
Use calibrated signal generators. However, use VG-819 for focus adjustment.

Color Analyzer :
The color analyzer should be CA-100 (made by MINOLTA) or compatible.

Note) Adjustment timings are timing tables and are not programmed timings.

3. OSM Menu Operation

3-1. Front Panel



3-2. OSM Menu

This unit is adjusted in on-screen menu by front panel key operation.

There are two types of menu.

(1) Menu (user): This Menu can be operated by the customer.

(2) Menu (service): This Menu is hidden from the customer, and is used by servicers.

Hereafter, they will be called MENU(U) and MENU(S).

The menu can be displayed when the signal is input to the display unit.

3-3. Factory Mode

This unit has the MPU function called "Factory Mode".

Factory Mode : LED color is usually yellow.
Power Management function is non-operational.

User Mode : LED color changes by an input condition of the sync signal.
When the sync signal is input to both the horizontal and vertical, LED color is green.

When the signal cable is disconnected from the signal generator, Power Management function operates.

It is not possible to enter MENU(S) by shortcut key.

Set the factory mode to the ON condition at adjustment time.
Set the factory mode to OFF (User Mode) after completing adjustment.

3-4. Factory Mode Setting

3-4-1. Endering Factory Mode

(1) Open Menu(U),TAB 5) "TOOL", and select "Freq. Information" item.

(2) Push and hold "RESET" SW and push "▶", "◀" SW at the same time.

(3) A "WARNING" will be displayed, then push "PROCEED" SW once.

(4) LED indicator light turn to Yellow from Green.

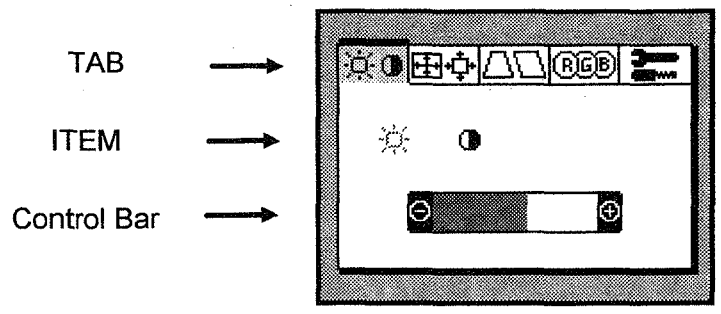
3-4-2. Exit Factory Mode

(1) When OSM MENU is displayed, push "EXIT" SW twice.
Otherwise, push "EXIT" SW once.

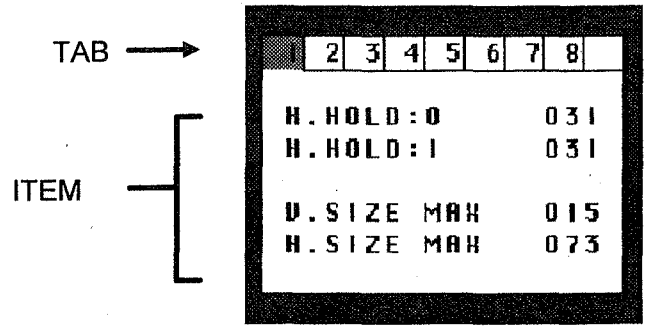
(2) When "WARNING" is displayed, push "EXIT" SW once.

(3) LED returns to Green.

3-5. Displaying the OSM (Open Menu)



Menu (U)



Menu (S)

3-6. OSM Turn Off

* To Close the Menu
Push "EXIT" SW while Menu (U) or Menu (S) is displayed

* To close MENU temporarily.
Push "PROCEED" SW once, while Menu (S) is being displayed.
Push "PROCEED" SW once more, Menu (S) is displayed again.

3-7. TAB, Item, Sub Menu Change

Menu (U) :

TAB to TAB	:	Push "PROCEED" SW.
Item to item	:	Push "▶" SW or "◀" SW.

Menu (S) :

TAB to TAB	:	Push "-" SW or "+" SW.
TAB to item	:	Push "▶" SW or "◀" SW
Item to TAB	:	When the top item is highlighted, push "▶" SW. When the bottom item is highlighted, push "◀" SW. Push "EXIT" all items.

3-8. To change Data Value

Data values are changed by pushing "-" or "+" SW.

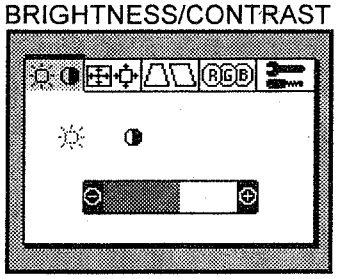
3-9. To save Data Value

Data values are saved on EEPROM, when highlighted ITEM is changed.

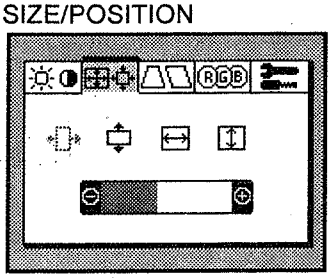
3-10. Structure of OSM Menu

Menu (U)

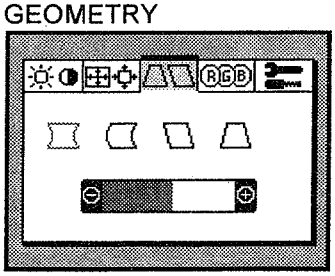
TAB 1) BRIGHTNESS/CONTRAST



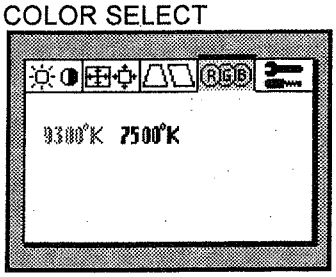
TAB 2) SIZE/POSITION



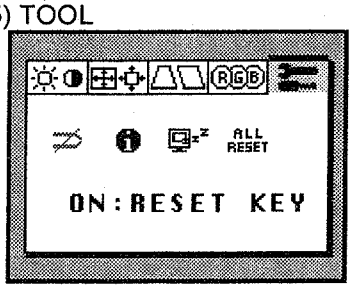
TAB 3) GEOMETRY



TAB 4) COLOR SELECT

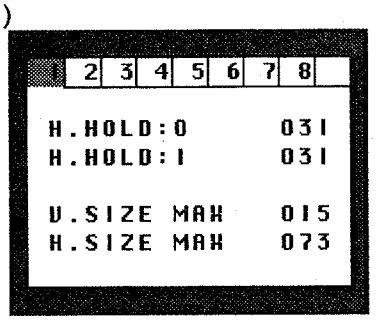


TAB 5) TOOL

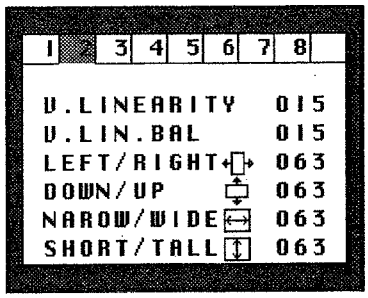


Menu (S)

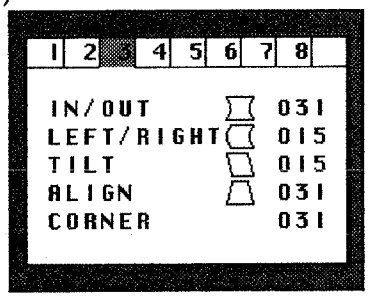
TAB 1)



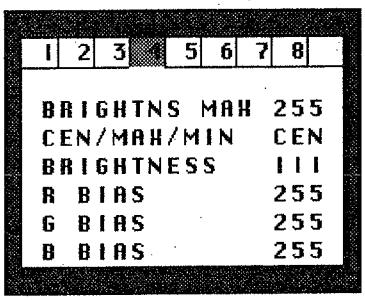
TAB 2)



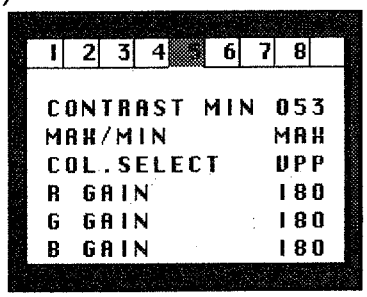
TAB 3)



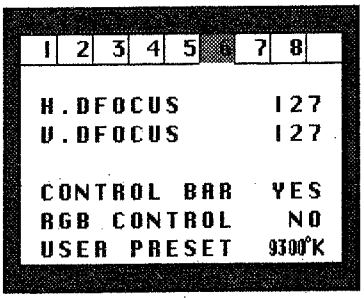
TAB 4)



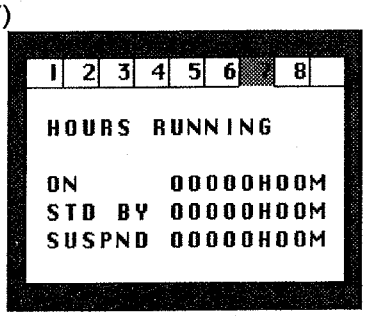
TAB 5)



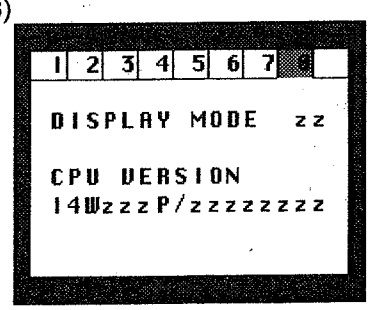
TAB 6)



TAB 7)



TAB 8)



4. ADJUSTMENT ITEMS

[A] Initial Settings

[B] Adjustment of SW. REG.

1. Adjustment method

[C] Pre-Adjustment

1. Horizontal Hold Adjustment
2. High-Voltage Adjustment

[D] Main Adjustment

1. Horizontal Hold Adjustment
2. Horizontal Raster Position
3. Horizontal Maximum Size Adjustment
4. Vertical Linearity Adjustment
5. Vertical Maximum Size Adjustment
6. Deflection Distortion Adjustment
    - 6-1. Horizontal / Vertical Size Rough Adjustment
    - 6-2. Picture Tilt Adjustment
    - 6-3. Side Pincushion Balance Adjustment
    - 6-4. Side Pincushion Adjustment
    - 6-5. Trapezoid distortion Adjustment
    - 6-6. Corner Distortion Adjustment
    - 6-7. Parallelogram Distortion Adjustment
    - 6-8. Distortion Adjustment
7. Preset Picture Size And Position Adjustment
8. Auto Adjustment (Size / Position / Distortion) (use the alignment jig for good efficiency)
    (As for step 2, step 3, step 5, step 6, it can be substituted in step 7.)
9. Video Amplitude Adjustment
    - 9-1. Gain Adjustment
    - 9-2. Cut Off Adjustment
    - 9-3. Brightness Max Adjustment
    - 9-4. Color Temperature Adjustment
10. Focus Adjustment
11. CRT Purity Convergence
12. OSM Bar Display

5. Reference

1. Adjustment Signal
2. Timing of Adjustment Signals
3. Position of Connector / Test point of Adjustment

Follow the instructions in this manual for adjustments.

(1) Push "RESET" SW to reset a highlighted item.
(2) After adjustment finished, close menu so as to make it memorize.
(3) Turn the monitor back on and confirm that the adjustment values / picture level / white balance / distortion values are the same before the Menu was closed.
(When "PROCEED" SW is pushed during Menu (S) is displayed, OSM Menu disappears.
If "PROCEED" SW is pushed once more, OSM reappears.)

[A] Initial Settings

Before adjusting, set the position of control as follows.

FBT	SCREEN VR	: Fully counterclockwise (MIN)
FOCUS		: Mechanical center
VR581		: Fully counterclockwise (MIN)
SW581		: Left (CRT) side
VR743		: Mechanical center
VR5T1		: Fully counterclockwise (MIN)

[B] Adjustment of SW. REG.

1. Adjustment method

Adjustment of SW. REG of this model is not performed.

[C] Pre-Adjustment

1. Horizontal Hold Adjustment

Signal:	No. 3 (VGA480)	All White
	No. 20 (VESA 1024*768 @85Hz)	All White

(1) Previous setting
Adjust SCREEN VR so that the back-raster is just visible.
Display OSM menu and adjust FOCUS VR in order to recognize displayed characters.
(2) Receive signal 3.
(3) Open Menu(S), TAB 1 "H.HOLD : 0" and push SWs "+" and "-" simultaneously. (This is free run mode)
(4) Adjust SWs "+" and "-" so that the image is stable.
(5) If adjustment is finished, push "▶" SW and select "H.HOLD : 1" item.
(6) Receive signal 20.
(7) Open Menu(S), TAB 1 "H.HOLD : 1" and push SWs "+" and "-" simultaneously. (This is free run mode)
(8) Adjust SWs "+" and "-" so that the image is stable.
(9) If adjustment is finished, push "◀" SW. (Normal picture is displayed)
(10) Receive signal 3. Check the screen that there is one image. If the screen is not stable, repeat steps (3) to (10).

2. High-Voltage Adjustment Signal 3 (VGA480) All Black

(1) Initial Setting
SCREEN VR : Fully counterclockwise
FOCUS VR : Fully counterclockwise
VR5T1 : Fully counterclockwise

(2) Receive signal 3.

(3) Adjust VR5T1 slowly so that high voltage is 25.0 kV±0.2 kV.

(4) Seal VR5T1 with a silicon adhesive and cap.

After adjusting , seal VR5T1 with a silicon adhesive and cap (74106841).

[D] Main Adjustment

1. Horizontal Hold Adjustment

Signal: No. 3 (VGA480) All White
No. 20 (VESA 1024*768 @85Hz) All White

(1) Previous setting
Adjust SCREEN VR so that the back-raster is just visible.
Display OSM menu and adjust FOCUS VR in order to recognize displayed characters.

(2) Receive signal 3.

(3) Open Menu(S), TAB 1 "H.HOLD : 0" and push SW "+" and "-" simultaneously. (This is free run mode)

(4) Adjust SWs "+" and "-" so that the image is stable.

(5) If adjustment is finished, push "▶" SW and select "H.HOLD : 1" item.

(6) Receive signal 20.

(7) Open Menu(S), TAB 1 "H.HOLD : 1" and push SW "+" and "-" simultaneously. (This is free run mode)

(8) Adjust SWs "+" and "-" so that the image is stable.

(9) If adjustment is finished, push "◀" SW. (Normal picture is displayed)

(10) Receive signal 3. Check the screen that there is one image. If the screen is not stable, repeat steps (3) to (10).

2. Horizontal Raster Position

Signal: No. 20 (VESA 1024*768) All Black

(1) Receive signal 20.

(2) Adjust SCREEN VR on the FBT so that the back raster just appears.

(3) Make sure to set the position of control as follows.

VR581 : Fully clockwise(MAX)

SW581 : Set position to the right side (CRT side)

(4) Open Menu(S), TAB 2 "NARROW / WIDE", Horizontal Size and adjust "+", "-" SW so that the horizontal size is 300±10 mm. If not able to set regulate value, open Menu(S), TAB 1 "H.SIZE MAX" and adjust it by pushing SWs "+" and "-".

(5) If raster has approached on the right of displayed area, switch SW581 position to the left.
If raster has approached on the left of displayed area, switch SW581 position to the right.

(6) Adjust VR581 so that the distance between the bezel and raster edges meets spec below.

$| X_{Left} - X_{Right} | \leqq 2.0$ mm

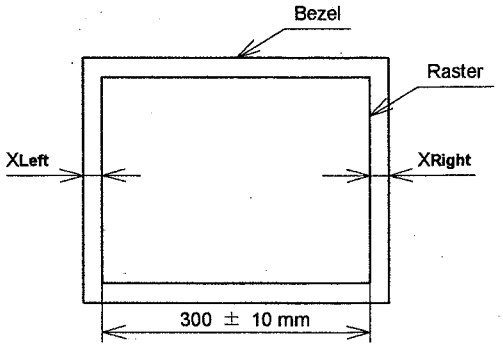


Fig 2-1 Horizontal Raster Centering

3. Horizontal Maximum Size Adjustment

Signals

Group A :	No. 1	VGA 350	No. 2	VGA 400
	No. 3	VGA 480	No. 5	VESA 800*600@60Hz
	No. 6	MAC 640*480	No. 7	VESA 350@85Hz
	No. 8	VESA 400@85Hz	No. 9	VESA 640*480@75Hz
	No. 10	XGA	No. 11	VESA 800*600@75Hz
	No. 12	VESA 640*480@85Hz	No. 13	VESA 800*600@72Hz
	No. 14	MAC 832*624	No. 15	VESA 800*600@85Hz
	No. 17	VESA 1024*768@70Hz	No. 18	VESA 1024*768@75Hz
	No. 19	VESA 1280*1024@60Hz	No. 20	VESA 1024*768@85Hz
Group B :	No. 4	PC98 640*400@70Hz	No. 16	640*480@100Hz
	No. 101	USER 2	No. 102	VESA 800*600@56Hz
	No. 103	USER 4	No. 104	1024*768@56Hz
	No. 105	VESA 1024*768@60Hz	No. 106	USER 7
	No. 107	800*600@80Hz	No. 108	1024*768@72Hz
	No. 109	VESA 1152*864@85Hz	No. 110	VESA 1600*1200(i)
	No. 111	640*480@120Hz	No. 112	MAC 1152*870

Video : All white

(1) Receive signal 2.

(2) Open Menu(S), TAB 2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered.

(3) Open Menu(S), TAB 2 "SHORT / TALL" and adjust "+", "-" SW so that the vertical size is 230±5 mm. If vertical size cannot be adjusted to 230 mm, open Menu(S), TAB 1 "V.SIZE MAX" and increase vertical amplitude. For signals No. 1 and No. 7, adjust amplitude to maximum with "SHORT / TALL" control.

(4) Open Menu(S), TAB 2 "LEFT / RIGHT" and adjust "+", "-" SW so that horizontal position is centered.

(5) Open Menu(S), TAB 3 "IN / OUT" and adjust "+", "-" SW to correct side pincushion distortion.

(6) Open Menu(S), TAB 1 "H.SIZE MAX" and push "RESET" SW.

(7) Open Menu(S), TAB 1 "H.SIZE MAX" and adjust "+", "-" SW so that the horizontal size is 316 $^{+2}_{-0}$ mm.

(8) Close menu.

(9) Repeat steps (1) to (8) for signals in group A.
Note : Adjust the vertical size of step (7) to 306 $^{+10}_{-0}$ mm using the signals which horizontal display time is 96.5% instead of the above signal.

(10) As signals group B :
Auto Adjustment : calculated data are written to EEPROM automatically based on results of adjustment data in group A.
Manual Adjustment : perform adjustments of all signals in steps (1) through (8).

4. Vertical Linearity Adjustment Signal: No. 18 (VESA 1024*768@75Hz) Cross hatch pattern

(1) Receive signal 18.
(2) Open Menu(S), TAB 2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
(3) Open Menu(S), TAB 2 "SHORT / TALL" and adjust "+" SW 230±3 mm.
If vertical size cannot be set, open Menu(S), TAB 1 "V.SIZE MAX" and increase vertical amplitude.
(4) Open Menu(S) TAB 2 "V.LIN.BAL" and adjust "+", "-" SW to make size of top square and bottom square equal vertically.
(5) Open Menu(S) TAB 2 "V.LINEARITY" and adjust "+", "-" SW to make size of top square and bottom square equal vertically.

Note: To hide the Menu temporarily for picture adjustment, push "PROCEED" SW once.
To display the service Menu, push "PROCEED" SW once again.

(6) Make sure that the linearity of top, center, and bottom on the screen are ±4 % or less.
(7) Close menu.

5. Vertical Maximum Size Adjustment Signal: No. 2 (VGA400) Reverse cross hatch pattern

(1) Receive signal 2.
(2) Make sure that vertical linearity is adjusted. If not adjust, return to adjustment No. 4 (Vertical Linearity Adjustment).
(3) Open Menu(S), TAB 2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered within the screen.
(4) Open Menu(S), TAB 1 "V.SIZE MAX" and push "RESET" SW.
(5) Adjust "+", "-" SW so that the vertical size is 237 $^{+2}_{-0}$ mm.
(6) Close menu.

Note : Adjust the value of step (5) to 230 $^{+2}_{-0}$ mm when using the signal with vertical display time of 97% instead of specified signals.

6. Deflection Distortion Adjustment

Note: Turn the CRT face to east and degauss the monitor using an external degaussing coil.
Hide the OSM menu when confirm the distortion.
When adjustment is finished, close menu to store the data values.

6-1. Horizontal / Vertical Size Rough Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Receive signal 11.
(2) Open Menu(S), TAB 2 "LEFT / RIGHT", "DOWN / UP", "NARROW / WIDE", "SHORT / TALL" and adjust the screen size to the following values.

Horizontal Size: 306 mm ± 5 mm
Vertical Size: 230 mm ± 5 mm

(3) Close menu.

6-2. Picture Tilt Adjustment

Signal: No. 11 (VESA 800*600@75Hz) Cross Hatch Pattern

(1) Receive signal 11.

(2) Turn the CRT face to east and degauss the monitor using an external degaussing coil.

(3) Make sure that the picture tilt meets the following specification :

$X \leqq \pm 1.8$ mm

If out of specification and cannot be adjusted, check and correct CRT assembly if necessary.

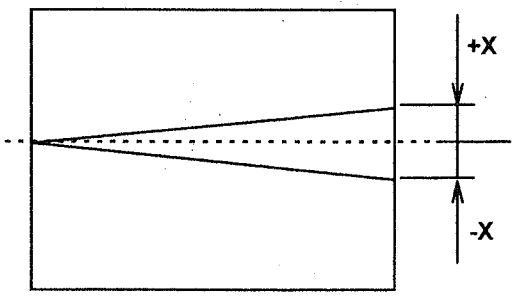


Fig 6-1 Picture Tilt

6-3. Side Pincushion Balance Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Open Menu(S), TAB 3 "LEFT / RIGHT".
Adjust "+", "-" SW so that the difference of X_{SL} and X_{SR} is equal (maximum 1.0 mm).

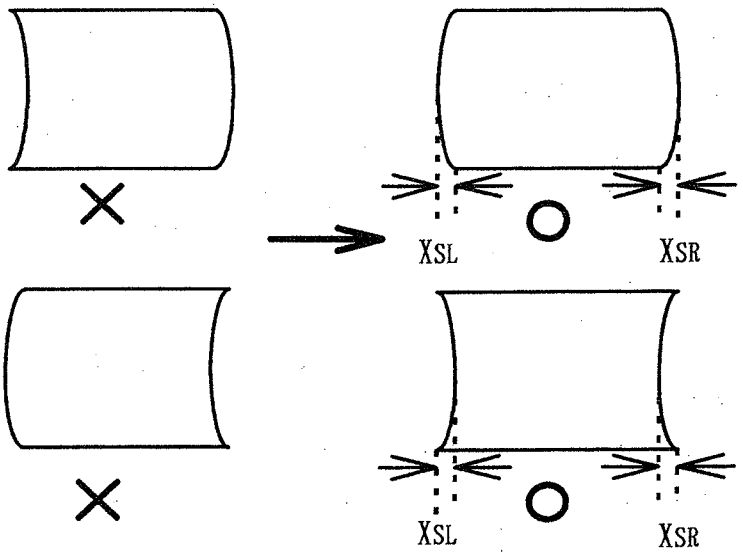


Fig 6-2 Side Pincushion Balance

6-4. Side Pincushion Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Open Menu(S), TAB 3 "IN / OUT".
Adjust "+", "-" SW so that the side pincushion distortion is minimized (maximum ±0.5 mm).

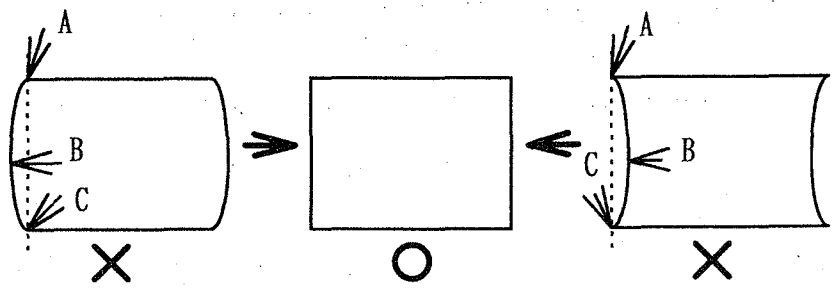


Fig 6-3 Side Pincushion

6-5. Trapezoid Distortion Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Open Menu(S), TAB 3 "ALIGN".
Adjust "+", "-" SW so that the Trapezoid Distortion is equal to X_{top} and X_{btm}. ($|X_{top} - X_{btm}| \leqq 1.0$ mm)

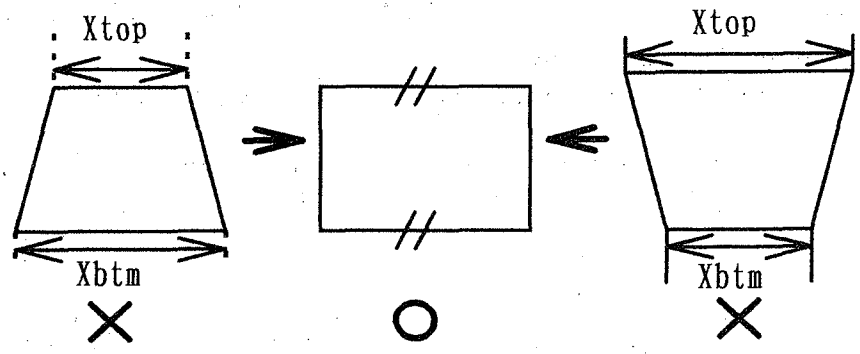


Fig 6-4 Trapezoid Distortion

6-6. Corner Distortion Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Open Menu(S), TAB 3 "CORNER".
Adjust "+", "-" SW so that the corners form a right angle. (maximum ± 1.0 mm)

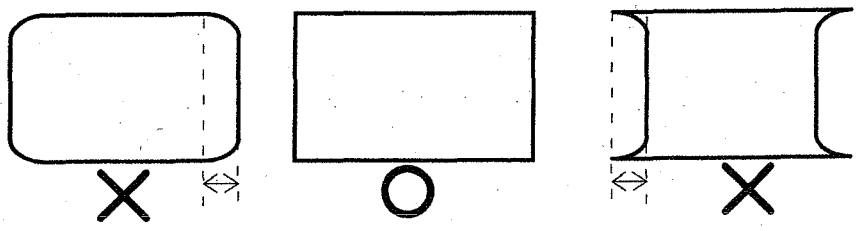


Fig 6-5 Corner Distortion

6-7. Parallelogram Distortion Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Open Menu(S), TAB 3 "TILT".
Adjust "+", "-" SW so that the vertical line and horizontal line at the screen's center is at right angles.(maximum 90° ± 0.5°)

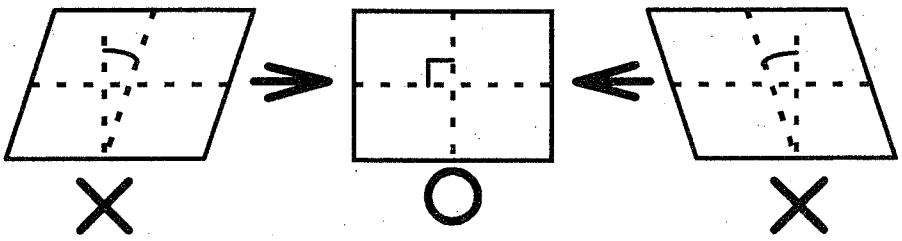


Fig 6-6 Parallelogram Distortion

6-8. Distortion Adjustment

Signal: No. 11 (VESA 800*600@75Hz) All white

(1) Confirm that adjustment on steps 6-1 to 6-7 meets the specifications.

(2) If undulating, re-adjust each distortion adjustment.
Undulation is a directional difference of tilt at either AC and CE or both.
Following figures (I) and (II) are example. AB and BC, CD and DE are the direction of tilt.
Undulated correction is the same direction of tilt at AB and BC, CD and DE.
Following figures (III) and (IV) are examples. In this state, each adjustment standard must be met.

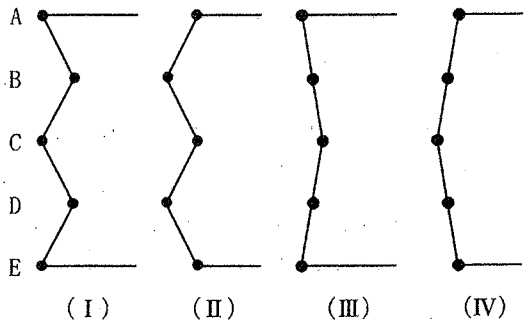


Fig 6-7 Undulated Definition

7. Preset Picture Size and Position Adjustment

Signal :	No. 3	VGA 480	No. 5	VESA 800*600@60Hz
	No. 9	VESA 640*480@75Hz	No. 11	VESA 800*600@75Hz
	No. 14	MAC 832*624	No. 18	VESA 1024*768@75Hz

Video : All White

(1) Receive signal 3.

(2) Open Menu(S), TAB 2 "LEFT / RIGHT", "DOWN / UP", "NARROW / WIDE", "SHORT / TALL" and adjust the picture size and position as listed below by "+", "-" SW.

Picture size	H : 306±5 mm
	V : 230±5 mm
Picture Position	H : $\lvert X_{Left} - X_{Right} \rvert \leqq 2.5$ mm
	V : $\lvert X_{Top} - X_{Bottom} \rvert \leqq 2.5$ mm

(3) Close menu.

(4) Receive the next signal and repeat steps (1) to (3).

Note: Before receiving the next signal, always push "EXIT" SW to store adjustments.

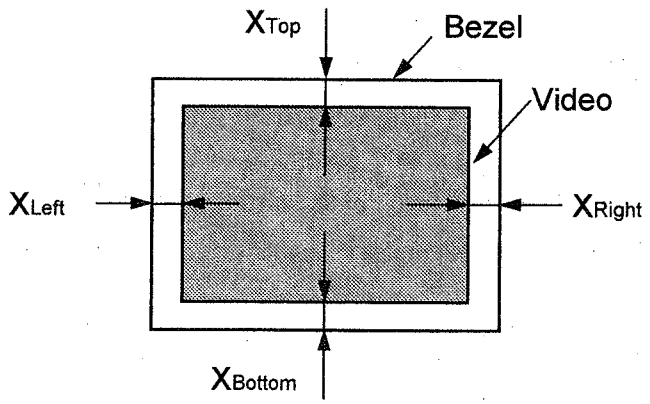


Fig 7-1 Picture Position

(5) Manual adjustment : Receive the signals below and repeat steps (1) through (3).
Auto adjustment : For the signals below, picture size and position are calculated from above adjustment data and data are written into EEPROM.

Signals :	No. 1	VGA 350	No. 2	VGA 400
	No. 6	MAC 640*480	No. 7	VESA 350@85Hz
	No. 8	VESA 400@85Hz	No. 10	XGA
	No. 12	VESA 640*480@85Hz	No. 13	VESA 800*600@72Hz
	No. 15	VESA 800*600@85Hz	No. 17	VESA 1024*768@70Hz
	No. 19	VESA 1280*1024@60Hz	No. 20	VESA 1024*768@85Hz

8. Auto Adjustment (Size / Position / Distortion)

8-1. Outline explanation

(1) Adjustment for Size, Position and Distortion for all preset signal can be done by selecting only one specified signal.
Accordingly, following adjustments can be done automatically by using this jig.
- Horizontal / Vertical Size Adjustment (include Max Size Adjustment)
- Horizontal / Vertical Position Adjustment
- Distortion Adjustment

(2) The Menu of this adjustment is representative and they differ with every model.
However operation method is the similar.

(3) If Horizontal / Vertical Max Size Adjustment are not need, it requires no adjustment.
If the model requires Horizontal / Vertical Max Size Adjustment, follow the instructions that are displayed.

8-2. Equipment for Adjustment

(1) Auto ADJ I/F jig

(2) ADJ cable 15P-8P

(3) ADJ cable 8S-8S

(4) The software for auto ADJ I/F jig

(5) Printer cable (Should be prepared at your side.)

(6) PC (PC-98) (Should be prepared at your side.)

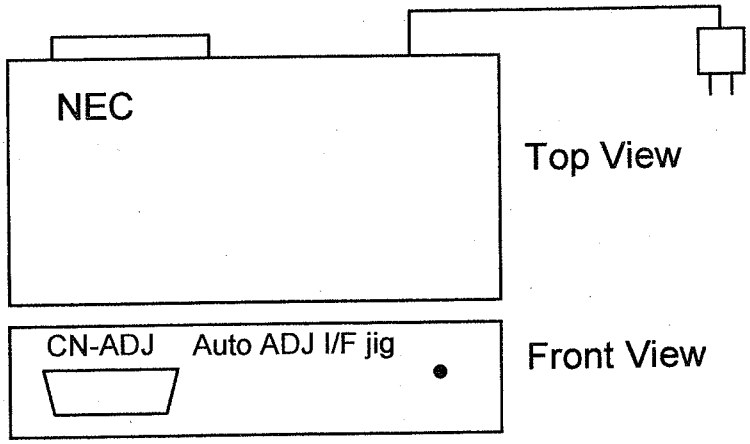


Fig 8-1 Auto ADJ I/F jig

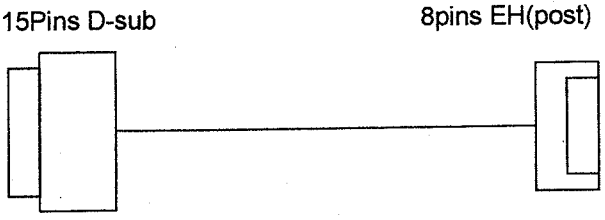


Fig 8-2 ADJ cable 15P-8P

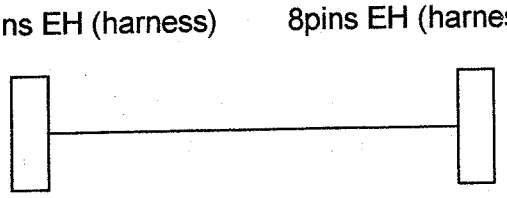


Fig 8-3 ADJ cable 8S-8S

8-3. Connection

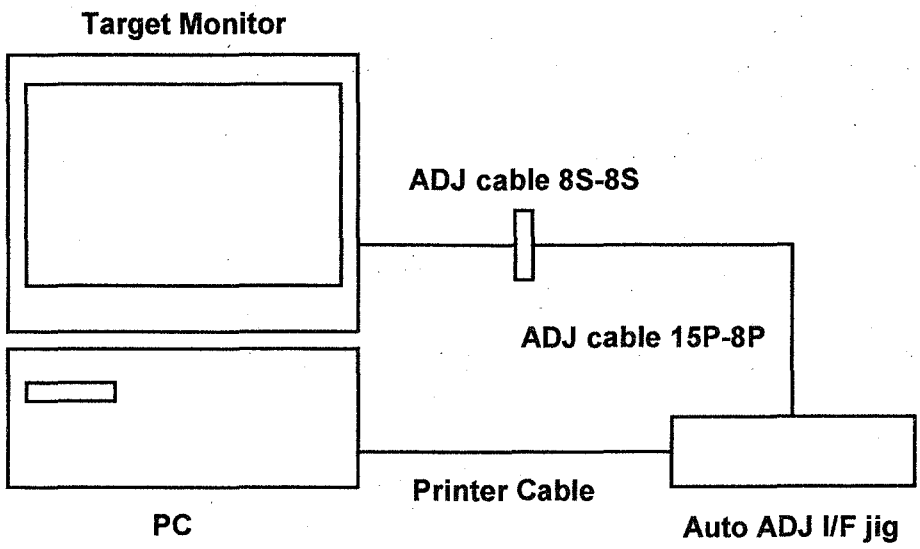


Fig 8-4 Connection

(1) Connect ADJ cable 15P-8P (From now on, this is abbreviated "15P-8P".) to Auto ADJ I/F jig (From here after, this is abbreviated "JIG".)

(2) Connect Printer cable to JIG AND PC.

(3) Connect ADJ cable 8S-8S to 15P-8P and CN-AJ of the monitor.

(4) Power on the monitor, JIG and PC after set up the software for auto ADJ I/F jig in PC.

All adjustment for Size, Position and Distortion can be done from PC by using this jig.
Adjustment for Size, Position and Distortion for all preset signal can be done by selecting only one specified ("80 : TOTAL") signal.

Note : Distortion adjustment signal may differ from another type monitor in some cases.
In this case, use signal displayed on the screen menu.

8-4. Operation

(1) Programming flow chart

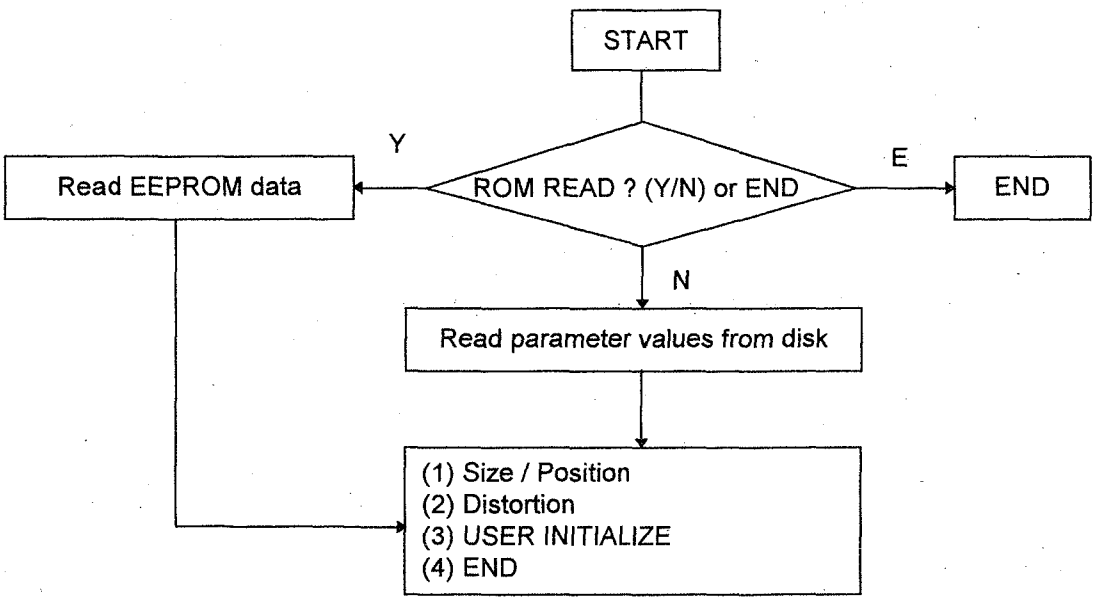


Fig 8-5 Programming flow chart of service adjustment

8-5. Adjustment procedures

(1) Start the program

a. Insert FD of software for auto ADJ I/F jig into PC.

b. Power on the monitor, auto ADJ I/F jig and PC.

c. As models list will appear on monitor screen, select the model number and push "RETURN" key.

d. As following message will appear on monitor screen, push "Y" or "N" key.

Size/Position Distortion Manual Adjust Program Version 1.01

ROM READ ? (Y/N) or END (E)

(Menu A)

If "Y" key is selected :

PC begins to read the data which is saved in EEPROM of the monitor, and to adjust the monitor using the data as reference.

If "N" key is selected :

PC begins to adjust the monitor using the data saved in program disk as reference.

Note : Push "N" key, when screen size and position are not correct and data are destroyed.

Also push "N" key, if you are not sure which reference to use.

If "E" key is selected :

PC ends adjustment program.

(2) Adjustment procedure

Adjust monitor in following steps.

a. USER INITIALIZE
b. Distortion adjustment
c. H. SIZE(MAX) adjustment
d. V. SIZE(MAX) adjustment
e. Size / Position adjustment

a. USER INITIALIZE

① The following menu B will appear on screen.

② Select "USER INITIALIZE" menu and push "RETURN" key.

③ Program begins "USER INITIALIZE" function.

1 : Size / Position
2 : Distortion
3 : USER INITIALIZE
4 : END

Note : Left menu may differ in some models.

(Menu B)

"1 : Size / Position" : Adjustment of size and position
"2 : Distortion" : Adjustment of distortion
"3 : USER INITIALIZE" : Write the size and position data written in the jig to monitor.
"4 : END" : Return to start menu screen

b. Distortion adjustment

① Select "Distortion" while menu B is displayed, and push "RETURN" key.

② As following menu will appear on monitor screen, adjust each item.
Input the adjustment signal that is specified as "80 : TOTAL" on menu D.

Note : Distortion adjustment signal may differ from another type of monitor in some cases.
In this case, use signal displayed on screen menu.

Distortion Adjust

1 : ROTATION
2 : PARALLELOGRAM
3 : TRAPEZOID
4 : PIN CUSHION
5 : PINCUSHION BALANCE
6 : CORNER
7 : V LINEAR
8 : V LINEAR BALANCE
9 : END

Note : Left menu may be differ in some models.

(Menu C)

c. H. SIZE(MAX) adjustment

① Select "Size / Position" while menu B is displayed, and push "RETURN" key.

② As following menu will appear on monitor screen, select "80 : TOTAL" and push "RETURN" key.

1 : VGA480
2 : MAC Ⅱ 640*480
3 : VESA 640*480@75
4 : 800*600@72
5 : MAC Ⅱ 832*624
6 : 1024*768@75
14 : VGA350
15 : VGA400
16 : 800*600@60
17 : EVGA350@84
18 : EVGA400@84
19 : XGA(8514/A)
20 : VESA 800*600@75
21 : VESA 640*480@85
22 : 800*600@85
23 : 1280*1024@60
24 : 640*480@100
25 : 1024*768@70
27 : PC98 640*400
80 : TOTAL (800*600@72)
81 : V. SIZE MAX(VGA400)
82 : END

No. ?

Note : Left menu may differ in some models.

(Menu D)

Meaning of each item in this menu is as follow :

From "1" to "27" : Adjust monitor on each signal
"81" : Adjust a vertical maximum size
"82" : Size / Position adjustment is ended

③ As following menu E appear on monitor screen, select "H. SIZE" and push "RETURN" key.

Size/Position Adjust

SIGNAL :TOTAL(800*600@72)
1 : H. POSI
2 : V. POSI
3 : H. SIZE
4 : V. SIZE
5 : H. SIZE(MAX)
6 : END

(Menu E)

④ As following menu F appear on monitor screen, push "5" key.
Then adjust data value to 255 by pushing one of "3", "6" and "9" keys.

Note : If screen is over scanned by smaller value than 255, push "RETURN" key to end "H. SIZE" adjustment.

Then select "5 : H. SIZE(MAX)" and decrease horizontal size, and set up data value to 255 at "H. SIZE" adjustment procedure.

In this case, you must be careful not to decrease horizontal size too small at "5 : H. SIZE(MAX)" adjustment.

Size/Position Adjust

SIGNAL :TOTAL(800*600@72)
1 : H. POSI
2 : V. POSI
3 : H. SIZE
4 : V. SIZE
5 : H. SIZE(MAX)
6 : END

No. ? 5
Decrease : 1(+1), 4(+5), 7(+10) Increase : 3(-1), 6(-5), 9(-10) Original : 5
END(NO WRITE) : e E END(WRITE) : ENTER

(Menu F)

Function of each key is as follows

"1" : data value decreases by 1 (H. SIZE becomes smaller)

"4" : data value decreases by 5 (H. SIZE becomes smaller)

"7" : data value decreases by 10 (H. SIZE becomes smaller)

"3" : data value increases by 1 (H. SIZE expands)

"6" : data value increases by 5 (H. SIZE expands)

"9" : data value increases by 10 (H. SIZE expands)

"5" : set up data value to reference value

"e or E" : ends without saving data

"ENTER": Ends after saved data

⑤ Return to Size / Position adjustment menu by pushing "e" key, and select "5 : H. SIZE(MAX)". Adjust the horizontal size to horizontal maximum size adjustment value on service manual.

⑥ If adjustment is ended, push "RETURN" key to end the adjustment.

(H. SIZE MAX data values of all preset signals are written by this operation.)

d. V. SIZE(MAX) adjustment

① Open menu D, "81 : V. SIZE(MAX)" and push "RETURN" key.

② Input a signal displayed on the screen. (If signal is not displayed on the screen, use a signal indicated vertical maximum size adjustment section in the service manual.)

③ As following message will appear on screen, push "RETURN" key.

"INPUT V. SIZE(MAX) SIGNAL HIT ENTER KEY"

④ Following menu G will appear on screen.

INPUT V. SIZE(MAX) SIGNAL HIT ENTER KEY

DAC VALUE : 140

Decrease : 1(+1), 4(+5), 7(+10) Increase : 3(-1), 6(-5), 9(-10) Original : 5

END(NO WRITE) : e E END(WRITE) : ENTER

(Menu G)

⑤ Adjust a vertical maximum size value as indicated on the service manual.

⑥ If adjustment is ended, push "RETURN" key to end the adjustment.

e. Size / Position adjustment

① Open menu B, "Size / Position" and push "RETURN" key.
② As following menu D appears on monitor screen, select "80 : TOTAL" and push "RETURN" key.
③ As following menu E appears on monitor screen, select "H. POSI" and push "RETURN" key.
④ Menu F will appear on monitor screen.
⑤ Input a signal indicated by menu screen F. (If signal is not indicated on screen, input the signal that is specified as "80 TOTAL" on menu D.)
⑥ Adjust the H. POSI to reference value which is specified on service manual by pushing "1", "4", "7", "3", "6" and "9" keys.
⑦ If adjustment is ended, push "RETURN" key to end the adjustment.
(H. POSI data values of all preset signals are written by this operation.)
⑧ Adjust V. POSI, H. SIZE and V. SIZE in the same way.
Adjust them as specified on the service manual.

f. Confirmation of Size / Position about another signals

① Open menu D, make sure that Size / Position values are in the standard of signals except "80 : TOTAL" signal.

Note : Do not forget to change signal of signal generator for each adjustment.

g. Handling when Size / Position are non-standard

① Open menu D, select non-standard signal and push "RETURN" key.
② When menu E is displayed on screen, select a non-standard item and push "RETURN" key.
③ Menu F will appear on monitor screen.
④ Input a non-standard signal.
⑤ Adjust the screen size / position again by pushing "1", "4", "7", "3", "6" and "9" keys.
⑥ If adjustment is ended, push "RETURN" key to end the adjustment.

Note : Do not perform the automatic adjustment ("80 : TOTAL"), after this adjustment is ended.
If you wrongly performed it, you must readjust this procedure.

9. Video Amplitude Adjustment

Make sure that the video signal level of generator is as follows :

Video : Analog 0.7 Vp-p ± 0.01 Vp-p (terminated 75 ohms ±1 %)

9-1. Gain Adjustment Signal : No. 23 (VESA 800*600@75Hz(Window) Window Pattern

(1) Receive the signal 23.

(2) Adjust brightness by SCREEN VR so that OSM menu appears.

(3) Open Menu(S), TAB 5 "MAX / MIN" and set to MAX. Open Menu(S), TAB 5 "COL SELECT" and set to "VPP" with "-" key. Open Menu(S), TAB 4 "BRIGHTNESS" and set the value to 128. If raster appears, adjust SUB BIAS (VR743) on the CRT PWB so that raster disappears.

(4) Open Menu(S), TAB 5 "R GAIN" / "G GAIN" / "B GAIN" and adjust "+", "-" SW so that TP-R / TP-G / TP-B on the CRT PWB is set to **42Vp-p +1/-0Vp-p**.
(Do not include clamp pulse. Refer to Fig 9-1.)
Note : Press the "PROCEED" SW to hide OSM, while performing this adjustment.

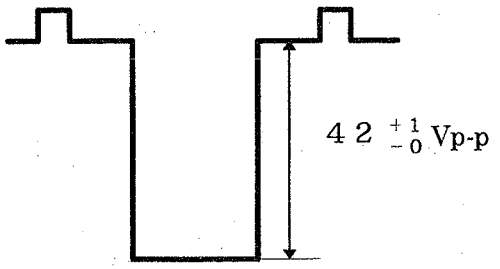


Fig 9-1 Video Amplitude (MAX)

(5) Close menu.

9-2. Cut Off Adjustment ⚠ Signal : No. 23 (VESA 800*600@75Hz(Window) all black

(1) Receive signal 23.

(2) Open Menu(S), TAB 4 and make sure that the value of "R BIAS", "G BIAS", "B BIAS" is 0. If it is not zero, adjust "−" SW.

(3) Connect a high voltage probe to TP-SC and adjust SCREEN VR to following value.
650 V_{DC} ± 5 V_{DC}
(Use a high voltmeter with maximum voltage of more than 1.5 kV and input resistance of more than 1000 M Ω.)

(4) Open Menu(S), TAB 5 "MAX / MIN" and adjust to MIN by pushing "+" SW.
Open Menu(S), TAB 4 "BRIGHTNESS" and set the value to 128. If raster disappears, adjust SUB BIAS (VR743) on the CRT PWB so that raster appears.
Note : Here after, use a color analyzer CA-100.
Hide the OSM menu when confirming the adjustments.

(5) Setting 00 channel of x, y and Y mode at the color analyzer and make sure that the following value is set.
x = 0.291 y = 0.313 Y = 0.2 cd/m²

(6) Turn the CA-100 into analyzer mode.

(7) Turn the SUB BIAS (VR743) on the CRT PWB clockwise until raster appears.
The color that appears first is the reference color. Adjust "+", "-" SW so that its color analyzer indicated value is 20 - 80.

(8) Open Menu(S), TAB 4 and adjust the reference color bias so that its analyzer indicated value is 100 - 120.

(9) Open Menu(S), TAB 4 and adjust other color biases so that its analyzer indicated value is 100 - 120.

Note : When the indicated value of the reference color is over 120, repeat steps (8) to (9).

(10) Close menu.

9-3. Brightness Max Adjustment Signal : No. 23 (VESA 800*600@75Hz(Window) all black

(1) Receive Signal 23.

(2) Set modes x, y, Y at the color analyzer.

(3) Open Menu(S), TAB 5 "MAX / MIN" and push "+" SW. (BRIGHTNESS : minimum.)
Open Menu(S), TAB 4 "CEN / MAX / MIN" and set to max.

(4) Open Menu(S), TAB 4 "BRIGHTNESS MAX" and adjust Y so that its analyzer indicated value is 6.0 ± 0.5 cd/㎡.

9-4. Color Temperature Adjustment Signal : No. 23 (VESA 800*600@75Hz(Window) all black

(1) Receive Signal 23(window pattern).

(2) Open Menu(S), TAB 4 "BRIGHTNESS" and set the value to 128.
Open Menu(S), TAB 5 "MAX / MIN" and set to MAX.

(3) Open Menu(S), TAB 5 "COL SELECT" and select "9300° K".
Open Menu(S), TAB 5 "R GAIN" / "G GAIN" / "B GAIN" and adjust color temperature to the following values :

x = 0.281 ± 0.003
y = 0.311 ± 0.003

At this time, do not change the adjustment value (in 9-1. GAIN) of the GAIN which is set to maximum.

(4) Open Menu(S), TAB 5 "COL SELECT" and select "7500° K".
Open Menu(S), TAB 5 "R GAIN" / "G GAIN" / "B GAIN" and adjust color temperature to the following values :

x = 0.300 ± 0.003
y = 0.315 ± 0.003

At this time, do not change the adjustment value (in 9-1. GAIN) of the GAIN which is set to maximum.

(5) Open Menu(S), TAB 6 "USER PRESET" and select "9300° K".

(6) Open Menu(S), TAB 6 "RGB CONTROL" and set to "NO".

(7) Close menu.

10. Focus Adjustment

Signal : No. 18 (1024*768@75Hz) Cross Hatch Pattern "&" character Pattern

(1) Receive Signal 18 (Cross Hatch Pattern).

(2) Make sure that the screen size are the following values :

H : 306 ± 5 mm

V : 230 ± 5 mm

(3) Adjust the voltage at TP-DF on the MAIN PWB to obtain the following values by turning VR's on the DF PWB. For the parabolic wave amplitude of the Horizontal cycle adjustment, use VR961. For the parabolic wave amplitude of the Vertical cycle voltage adjustment, use VR962.

Horizontal cycle : 580 V ± 10 Vp-p

Vertical cycle : 140 V ± 5 Vp-p

Note: When measuring Vp-p, use a 100:1 probe with capacitance of approx. 2 pF.

(4) Disconnect the probe.

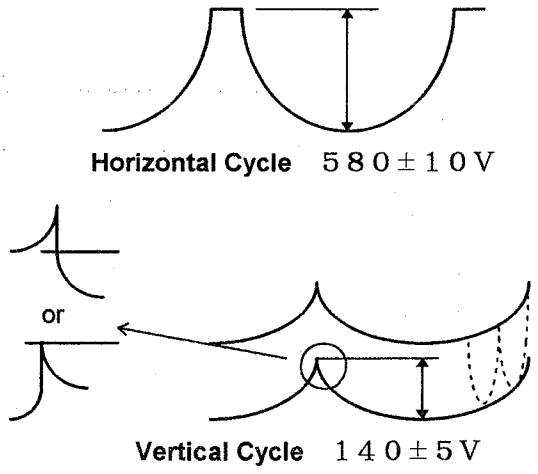


Fig 10-1 Dynamic Focus Wave Form

(5) Open Menu(U), TAB 1 and adjust "CONTRAST" to MAX.
Select "BRIGHTNESS" and push "RESET" SW. (This is cut off state)

(6) Adjust FOCUS VR on the FBT to the thinnest vertical lines and horizontal lines.
Adjust for uniform focus on the whole screen. Make sure that horizontal lines do not form halos.

(7) Receive Signal 18 (1024*768@75Hz "&" character Pattern).

(8) Make sure that the white "&" characters are crisp as possible on the whole screen.

(9) When the focus is not obtained in step (8), adjust FOCUS VR on the FBT so that the whole screen is uniform.

(10) Receive Signal 18 (1024*768@75Hz Cross Hatch Pattern) and make sure that R, G, B lines do not form halos.

11. CRT Purity Convergence

Signal : No. 18 (1024*768@75Hz) Cross Hatch Pattern "&" character Pattern

(1) The CRT face should be facing east and degauss the entire unit with an external degaussing coil.

(2) Receive the cross hatch pattern of signal 18 and make sure that the screen size is following values :

H : 306 ± 5.0 mm V : 230 ± 5.0 mm

(3) Measuring the misconvergence, if not with the following specification, adjust the static convergence by using the 4-pole / 6-pole magnets on the CPM assembly.

x ≦ 0.35 mm y ≦ 0.35 mm

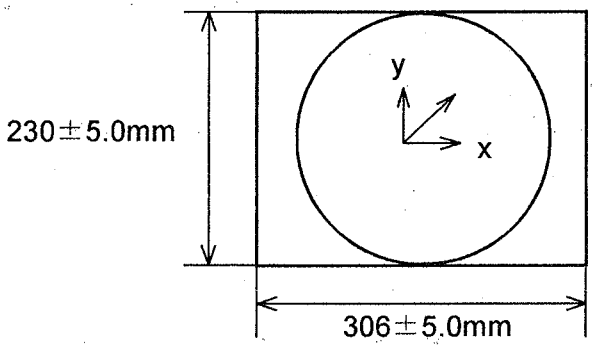


Fig 11-1 Convergence

12. OSM Bar Display

(1) Open Menu(U), TAB6 "CONTROL BAR" and set "YES".

(2) Close menu.

5. Reference

1. Adjustment Signal

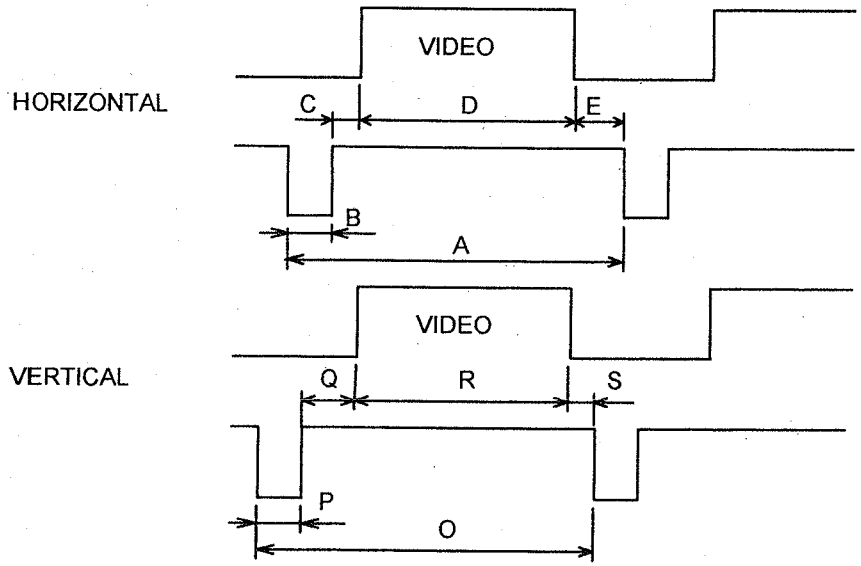
NO	Signal Name	Video Signal	SYNC POLARITY (H/V)
1	VGA 350	Video Signal 0.7V	H/V Separate P/N
2	VGA 400	Video Signal 0.7V	H/V Separate N/P
3	VGA 480	Video Signal 0.7V	H/V Separate N/N
4	PC98 640*400@70Hz	Video Signal 0.7V	H/V Separate N/N
5	VESA 800*600@60Hz	Video Signal 0.7V	H/V Separate P/P
6	MAC 640*480	R Video Signal 0.7V G Video Signal 1.0V B Video Signal 0.7V	Composite Sync Signal N/N
7	VESA 350@85Hz	Video Signal 0.7V	H/V Separate P/N
8	VESA 400@85Hz	Video Signal 0.7V	H/V Separate N/P
9	VESA 640*480@75Hz	Video Signal 0.7V	H/V Separate N/N
10	XGA	Video Signal 0.7V	H/V Separate P/P
11	VESA 800*600@75Hz	Video Signal 0.7V	H/V Separate P/P
12	VESA 640*480@85Hz	Video Signal 0.7V	H/V Separate N/N
13	VESA 800*600@72Hz	Video Signal 0.7V	H/V Separate P/P
14	MAC 832*624	R Video Signal 0.7V G Composite Video Signal 1.0V B Video Signal 0.7V	Composite Sync Signal N/N
15	VESA 800*600@85Hz	Video Signal 0.7V	H/V Separate P/P
16	640*480@100Hz	Video Signal 0.7V	H/V Separate N/N
17	VESA 1024*768@70Hz	Video Signal 0.7V	H/V Separate N/N
18	VESA 1024*768@75Hz	Video Signal 0.7V	H/V Separate P/P
19	VESA 1280*1024@60Hz	Video Signal 0.7V	H/V Separate P/P
20	VESA 1024*768@85Hz	Video Signal 0.7V	H/V Separate P/P
21	1280*1024@70Hz	R Video Signal 0.7V G Composite Video Signal 1.0V B Video Signal 0.7V	
22	VESA 1280*1024@75Hz	Video Signal 0.7V	H/V Separate P/P
23	VESA 800*600@75Hz (Window)	Video Signal 0.7V	H/V Separate P/P
24	EDID	Video Signal 0.7V	H/V Separate N/N
25	VGA480(1/2)	Video Signal 0.7V	H/V Separate N/N
101	USER 2	Video Signal 0.7V	H/V Separate P/P
102	VESA 800*600@56Hz	Video Signal 0.7V	H/V Separate P/P
103	USER 4	Video Signal 0.7V	H/V Separate P/P
104	1024*768@56Hz	Video Signal 0.7V	H/V Separate N/N
105	VESA 1024*768@60Hz	Video Signal 0.7V	H/V Separate N/N
106	USER 7	Video Signal 0.7V	H/V Separate N/N
107	800*600@80Hz	Video Signal 0.7V	H/V Separate P/P
108	1024*768@72Hz	Video Signal 0.7V	H/V Separate P/P
109	1152*864@70Hz	Video Signal 0.7V	H/V Separate P/P
110	VESA 1600*1200(i)	Video Signal 0.7V	H/V Separate P/P
111	640*480@120Hz	Video Signal 0.7V	H/V Separate N/N
112	MAC 1152*870	Video Signal 0.7V	H/V Separate N/N

※ Cross hatch pattern consist of the 17 vertical lines and the 13 horizontal lines.

2. Timing of Adjustment Signals

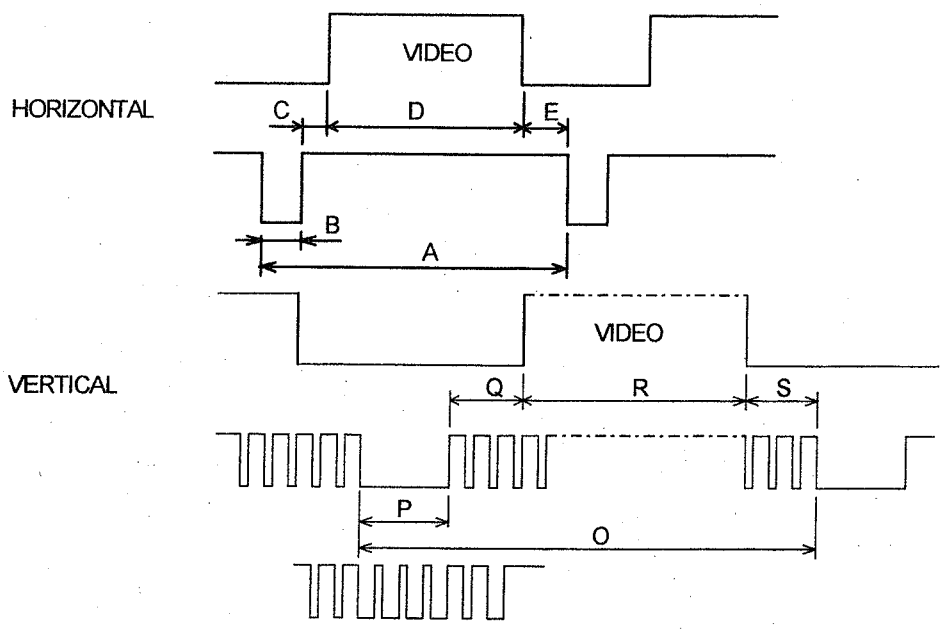
Signal Timing Charts

SEPARATE SYNC



Sync Polarity : Positive/Negative

COMPOSITE SYNC



Sync Polarity : Positive/Negative

Adjustment / Inspection Signal (1)

	PROGRAM NO.		1	2	3	4	5	6
	SIGNAL NAME		VGA350	VGA400	VGA480	PC98 640*400 @70Hz	VESA 800*600 @60Hz	MAC 640*480
	RESOLUTION		640*350	640*400	640*480	640*400	800*600	640*480
	DOT CLOCK	(MHz)	25.175	25.175	25.175	25.175	40	30.24
	fh	(kHz)	31.47	31.47	31.47	31.469	37.879	35.00
	fv	(Hz)	70.09	70.09	59.94	70.086	60.317	66.67
H	CELL SIZE	(DOT)	8	8	8	8	8	8
	(A) TOTAL	(DOT)	800	800	800	800	1056	864
		(CHR)	100	100	100	100	132	108
		(uS)	31.78	31.78	31.78	31.778	26.40	28.57
	(D) DISP	(DOT)	640	640	640	640	800	640
		(CHR)	80	80	80	80	100	80
		(uS)	25.42	25.42	25.42	25.422	20.00	21.16
	(E) FRONT	(DOT)	16	16	16	17	40	64
		(uS)	0.64	0.64	0.64	0.675	1.00	2.12
	(B) SYNC PULSE	(DOT)	96	96	96	64	128	64
		(uS)	3.81	3.81	3.81	2.542	3.20	2.12
	(C) BACK	(DOT)	48	48	48	79	88	96
		(uS)	1.91	1.91	1.91	3.138	2.20	3.17
V	CELL SIZE	(H)	16	16	16	16	16	16
	(O) TOTAL	(H)	449	449	525	449	628	525
		(mS)	14.268	14.268	16.683	14.268	16.579	15.000
	(R) DISP	(H)	350	400	480	400	600	480
		(CHR)	21.875	25	30	25	37.5	30
		(mS)	11.122	12.711	15.253	12.711	15.840	13.714
	(S) FRONT	(H)	37	12	10	13	1	3
		(mS)	1.176	0.381	0.318	0.413	0.0260	0.086
	(P) SYNC PULSE	(H)	2	2	2	2	4	3
		(mS)	0.064	0.064	0.064	0.064	0.106	0.086
	(Q) BACK	(H)	60	35	33	34	23	39
		(mS)	1.907	1.112	1.049	1.080	0.607	1.114
	INTERLACE		NON	NON	NON	NON	NON	NON
	POLARITY	(H/V)	POS/NEG	NEG/POS	NEG/NEG	NEG/NEG	POS/POS	NEG/NEG
	COMPOSITE SYNC							Yes
	COMPOSITE VIDEO							GREEN
	CHARACTER FONT		7*9	7*9	7*9	7*9	7*9	7*9
	SERRATION		OFF	OFF	OFF	OFF	OFF	ON
	EQP		OFF	OFF	OFF	OFF	OFF	OFF

Adjustment / Inspection Signal (2)

	PROGRAM NO.		7	8	9	10	11	12
	SIGNAL NAME		VESA 350 @85Hz	VESA 400 @85Hz	VESA 640*480 @75Hz	XGA	VESA 800*600 @75Hz	VESA 640*480 @85Hz
	RESOLUTION		640*350	640*400	640*480	1024*768	800*600	640*480
	DOT CLOCK	(MHz)	31.5	31.500	31.5	44.9	49.5	36
	fh	(kHz)	37.86	37.861	37.5	35.52	46.875	43.27
	fv	(Hz)	85.08	85.080	75.00	43.48	75.00	85.01
H	CELL SIZE	(DOT)	8	8	8	8	8	8
	(A) TOTAL	(DOT)	832	832	840	1264	1056	832
		(CHR)	104	104	105	158	132	104
		(uS)	26.413	26.413	26.67	28.15	21.33	23.11
	(D) DISP	(DOT)	640	640	640	1024	800	640
		(CHR)	80	80	80	128	100	80
		(uS)	6.36	20.317	20.32	22.81	16.162	17.78
	(E) FRONT	(DOT)	32	32	16	8	16	32
		(uS)	1.016	1.016	0.51	0.18	0.323	0.89
	(B) SYNC PULSE	(DOT)	32	32	64	176	80	48
		(uS)	1.016	1.016	2.03	3.92	1.616	1.33
	(C) BACK	(DOT)	128	128	120	56	160	112
		(uS)	4.063	4.063	3.81	1.25	3.232	3.11
V	CELL SIZE	(H)	16	16	16	16	16	16
	(O) TOTAL	(H)	445	445	500	817	625	509
		(mS)	11.754	11.754	13.333	23.000	13.333	11.764
	(R) DISP	(H)	350	400	480	768	600	480
		(CHR)	21.875	25	30	48	37.5	30
		(mS)	9.244	10.565	12.800	21.620	12.800	11.093
	(S) FRONT	(H)	32	1	1	0	1	1
		(mS)	0.845	0.026	0.027	0.000	0.021	0.023
	(P) SYNC PULSE	(H)	3	3	3	8	3	3
		(mS)	0.079	0.079	0.080	0.225	0.064	0.069
	(Q) BACK	(H)	60	41	16	41	21	25
		(mS)	1.585	1.083	0.427	1.154	0.448	0.578
	INTERLACE		NON	NON	NON	S&VIDEO	NON	NON
	POLARITY	(H/V)	POS/NEG	NEG/POS	NEG/NEG	POS/POS	POS/POS	NEG/NEG
	COMPOSITE SYNC							
	COMPOSITE VIDEO							
	CHARACTER FONT		7*9	7*9	7*9	7*9	7*9	7*9
	SERRATION		OFF	OFF	OFF	OFF	OFF	OFF
	EQP		OFF	OFF	OFF	OFF	OFF	OFF

Adjustment / Inspection Signal (3)

	PROGRAM NO.		13	14	15	16	17	18
	SIGNAL NAME		VESA 800*600 @72Hz	MAC 832*624	VESA 800*600 @85Hz	640*480 @100Hz	VESA 1024*768 @70Hz	VESA 1024*768 @75Hz
	RESOLUTION		800*600	832*624	800*600	640*480	1024*768	1024*768
	DOT CLOCK	(MHz)	50	57.283	56.25	45	75	78.75
	fh	(kHz)	48.077	49.72	53.67	53.066	56.48	60.02
	fv	(Hz)	72.188	74.55	85	100.50	70.07	75.03
H	CELL SIZE	(DOT)	8	8	8	8	8	8
	(A) TOTAL	(DOT)	1040	1152	1048	848	1328	1312
		(CHR)	130	144	131	106	166	164
		(uS)	20.8	20.11	18.63	18.84	17.71	16.66
	(D) DISP	(DOT)	800	832	800	640	1024	1024
		(CHR)	100	104	100	80	128	128
		(uS)	16	14.52	14.22	14.22	13.65	13.00
	(E) FRONT	(DOT)	56	32	32	32	24	16
		(uS)	1.12	0.56	0.57	0.71	0.32	0.203
	(B) SYNC PULSE	(DOT)	120	64	64	64	136	96
		(uS)	2.4	1.12	1.14	1.42	1.81	1.219
	(C) BACK	(DOT)	64	224	152	112	144	176
		(uS)	1.28	3.91	2.70	2.49	1.92	2.235
V	CELL SIZE	(H)	16	16	16	16	16	16
	(O) TOTAL	(H)	666	667	631	528	806	800
		(mS)	13.853	13.414	11.756	9.949	14.272	13.328
	(R) DISP	(H)	600	624	600	480	768	768
		(CHR)	37.5	39	37.5	30	48	48
		(mS)	12.48	12.549	11.179	9.045	13.599	12.795
	(S) FRONT	(H)	37	1	1	4	3	1
		(mS)	0.770	0.020	0.019	0.075	0.053	0.017
	(P) SYNC PULSE	(H)	6	3	3	4	6	3
		(mS)	0.125	0.060	0.056	0.075	0.106	0.050
	(Q) BACK	(H)	23	39	27	40	29	28
		(mS)	0.478	0.784	0.503	0.753	0.513	0.466
	INTERLACE		NON	NON	NON	NON	NON	NON
	POLARITY	(H/V)	POS/POS	NEG/NEG	POS/POS	NEG/NEG	NEG/NEG	POS/POS
	COMPOSITE SYNC			Yes				
	COMPOSITE VIDEO			Green				
	CHARACTER FONT		7*9	7*9	7*9	7*9	7*9	7*9
	SERRATION		OFF	ON	OFF	OFF	OFF	OFF
	EQP		OFF	OFF	OFF	OFF	OFF	OFF

Adjustment / Inspection Signal (4)

	PROGRAM NO.		19	20	21	22	23	24
	SIGNAL NAME		VESA 1280*1024 @60Hz	VESA 1024*768 @85Hz	1280*1024 @70Hz	VESA 1280*1024 @75Hz	VESA 800*600 Window	EDID
	RESOLUTION		1280*1024	1024*768	1280*1024	1280*1024	800*600	720*685
	DOT CLOCK	(MHz)	108	94.5	127	135	49.5	28.322
	fh	(kHz)	63.98	68.68	74.97	79.976	46.875	31.47
	fv	(Hz)	60.02	85.00	69.87	75.025	75.00	42.01
H	CELL SIZE	(DOT)	8	8	8	8	8	9
	(A) TOTAL	(DOT)	1688	1376	1696	1688	1056	900
		(CHR)	211	172	212	211	132	100
		(uS)	15.63	14.560	13.354	12.504	21.33	31.78
	(D) DISP	(DOT)	1280	1024	1280	1280	240	720
		(CHR)	160	128	160	160	100	80
		(uS)	11.85	10.836	10.079	9.481	4.847	25.42
	(E) FRONT	(DOT)	48	48	32	16	296	18
		(uS)	0.44	0.508	0.252	0.119	5.978	0.64
	(B) SYNC PULSE	(DOT)	112	96	160	144	80	108
		(uS)	1.04	1.016	1.260	1.067	1.616	3.81
	(C) BACK	(DOT)	248	208	224	248	440	54
		(uS)	2.30	2.201	1.760	1.873	8.887	1.906
V	CELL SIZE	(H)	16	16	16	16	16	14
	(O) TOTAL	(H)	1066	808	1073	1066	625	749
		(mS)	16.661	11.765	14.316	13.329	13.333	23.80
	(R) DISP	(H)	1024	768	1024	1024	180	685
		(CHR)	64	48	64	64	37.5	48.93
		(mS)	16.005	11.183	13.675	12.804	3.839	21.77
	(S) FRONT	(H)	1	1	3	1	210	14
		(mS)	0.016	0.015	0.027	0.013	4.48	0.44
	(P) SYNC PULSE	(H)	3	3	4	3	3	3
		(mS)	0.047	0.044	0.053	0.038	0.064	0.095
	(Q) BACK	(H)	38	36	42	38	231	47
		(mS)	0.594	0.524	0.561	0.475	4.927	1.494
	INTERLACE		NON	NON	NON	NON	NON	NON
	POLARITY	(H/V)	POS/POS	POS/POS	NEG/NEG	POS/POS	POS/POS	NEG/NEG
	COMPOSITE SYNC							
	COMPOSITE VIDEO				GREEN			
	CHARACTER FONT		7*9	7*9	7*9	7*9	7*9	7*9
	SERRATION		OFF	OFF	OFF	OFF	OFF	OFF
	EQP		OFF	OFF	OFF	OFF	OFF	OFF

Adjustment / Inspection Signal (5)

	PROGRAM NO.		25					
	SIGNAL NAME		VGA480 (1/2)					
	RESOLUTION		640*240					
	DOT CLOCK	(MHz)	25.175					
	fh	(kHz)	31.47					
	fv	(Hz)	59.94					
H	CELL SIZE	(DOT)	8					
	(A) TOTAL	(DOT)	800					
		(CHR)	100					
		(uS)	31.78					
	(D) DISP	(DOT)	640					
		(CHR)	80					
		(uS)	25.42					
	(E) FRONT	(DOT)	16					
		(uS)	0.64					
	(B) SYNC PULSE	(DOT)	96					
		(uS)	3.81					
	(C) BACK	(DOT)	48					
		(uS)	1.91					
V	CELL SIZE	(H)	16					
	(O) TOTAL	(H)	525					
		(mS)	16.683					
	(R) DISP	(H)	240					
		(CHR)	15					
		(mS)	7.627					
	(S) FRONT	(H)	10					
		(mS)	0.318					
	(P) SYNC PULSE	(H)	2					
		(mS)	0.064					
	(Q) BACK	(H)	273					
		(mS)	8.675					
	INTERLACE		NON					
	POLARITY	(H/V)	NEG/NEG					
	COMPOSITE SYNC							
	COMPOSITE VIDEO							
	CHARACTER FONT		7*9					
	SERRATION		OFF					
	EQP		OFF					

Adjustment / Inspection Signal (6)

	PROGRAM NO.		101	102	103	104	105	106
	SIGNAL NAME		USER 2	VESA 800*600 @56Hz	USER 4	1024*768 @56Hz	VESA 1024*768 @60Hz	USER 7
	RESOLUTION		640*400	800*600	640*480	1024*768	1024*768	832*542
	DOT CLOCK	(MHz)	25.175	36.000	31.500	60.490	65.000	57.283
	fh	(kHz)	31.47	35.16	37.50	45.01	48.36	49.72
	fv	(Hz)	70.09	56.25	75.00	55.98	60.00	84.99
H	CELL SIZE	(DOT)	8	8	8	8	8	8
	(A) TOTAL	(DOT)	800	1024	840	1344	1344	1152
		(CHR)	100	128	105	168	168	144
		(uS)	31.78	28.44	26.67	22.22	20.67	20.11
	(D) DISP	(DOT)	640	800	640	1024	1024	832
		(CHR)	80	100	80	128	128	104
		(uS)	25.42	22.22	20.32	16.93	15.75	14.52
	(E) FRONT	(DOT)	16	24	16	24	24	32
		(uS)	0.64	0.67	0.51	0.40	0.37	0.56
	(B) SYNC PULSE	(DOT)	96	72	64	136	136	64
		(uS)	3.81	2.00	2.03	2.25	2.09	1.12
	(C) BACK	(DOT)	48	128	120	160	160	224
		(uS)	1.91	3.56	3.81	2.65	2.46	3.91
V	CELL SIZE	(H)	16	16	16	16	16	16
	(O) TOTAL	(H)	449	625	500	804	806	585
		(mS)	14.268	17.778	13.333	17.864	16.666	11.766
	(R) DISP	(H)	400	600	480	768	768	542
		(CHR)	25	37.5	30	48	48	33
		(mS)	12.711	17.067	12.800	17.064	15.880	10.901
	(S) FRONT	(H)	12	1	1	1	3	1
		(mS)	0.381	0.028	0.027	0.022	0.062	0.020
	(P) SYNC PULSE	(H)	2	2	3	6	6	3
		(mS)	0.064	0.057	0.080	0.133	0.124	0.060
	(Q) BACK	(H)	35	22	16	29	29	39
		(mS)	1.112	0.626	0.427	0.644	0.600	0.784
	INTERLACE		NON	NON	NON	NON	NON	NON
	POLARITY	(H/V)	POS/POS	POS/POS	POS/POS	NEG/NEG	NEG/NEG	NEG/NEG
	COMPOSITE SYNC							
	COMPOSITE VIDEO							
	CHARACTER FONT		7*9	7*9	7*9	7*9	7*9	7*9
	SERRATION		OFF	OFF	OFF	OFF	OFF	OFF
	EQP		OFF	OFF	OFF	OFF	OFF	OFF

Adjustment / Inspection Signal (7)

	PROGRAM NO.		107	108	109	110	111	112
	SIGNAL NAME		800*600 @80Hz	1024*768 @72Hz	1152*864 @70Hz	VESA 1600*1200 (i)	640*480 @120Hz	MAC 1152*870
	RESOLUTION		800*600	1024*768	1152*864	166*1200	640*480	1152*870
	DOT CLOCK	(MHz)	54.500	79.000	94.500	135.000	54.000	100.000
	fh	(kHz)	52.00	58.09	63.85	62.50	63.68	68.68
	fv	(Hz)	80.01	71.98	70.01	96.15	120.61	75.06
H	CELL SIZE	(DOT)	8	8	8	8	8	8
	(A) TOTAL	(DOT)	1048	1360	1480	2160	848	1456
		(CHR)	131	170	185	270	106	182
		(uS)	19.23	17.22	15.66	16.00	15.70	14.56
	(D) DISP	(DOT)	800	1024	1152	1600	640	1152
		(CHR)	100	128	144	200	80	144
		(uS)	14.68	12.96	12.19	11.85	11.85	11.52
	(E) FRONT	(DOT)	8	8	32	48	32	32
		(uS)	0.15	0.10	0.34	0.36	0.59	0.32
	(B) SYNC PULSE	(DOT)	80	288	96	192	64	128
		(uS)	1.47	3.65	1.02	1.42	1.19	1.28
	(C) BACK	(DOT)	160	40	200	320	112	144
		(uS)	2.94	0.51	2.12	2.37	2.07	1.44
V	CELL SIZE	(H)	16	16	16	16	16	16
	(O) TOTAL	(H)	650	807	912	650	528	915
		(mS)	12.449	13.893	14.283	10.400	8.292	13.322
	(R) DISP	(H)	600	768	864	600	480	870
		(CHR)	37.5	48	54	37.5	30	54.375
		(mS)	11.538	13.221	13.531	9.600	7.538	12.667
	(S) FRONT	(H)	26	0	1	1	2	3
		(mS)	0.500	0	0.016	0.016	0.031	0.044
	(P) SYNC PULSE	(H)	3	8	3	3	4	3
		(mS)	0.058	0.138	0.047	0.048	0.063	0.044
	(Q) BACK	(H)	21	31	44	46	42	39
		(mS)	0.404	0.534	0.689	0.736	0.660	0.568
	INTERLACE		NON	NON	NON	S&VIDEO	NON	NON
	POLARITY	(H/V)	POS/POS	POS/POS	POS/POS	POS/POS	NEG/NEG	NEG/NEG
	COMPOSITE SYNC							
	COMPOSITE VIDEO							
	CHARACTER FONT		7*9	7*9	7*9	7*9	7*9	7*9
	SERRATION		OFF	OFF	OFF	OFF	OFF	OFF
	EQP		OFF	OFF	OFF	OFF	OFF	OFF

3. Position of Connector / Test point of Adjustment

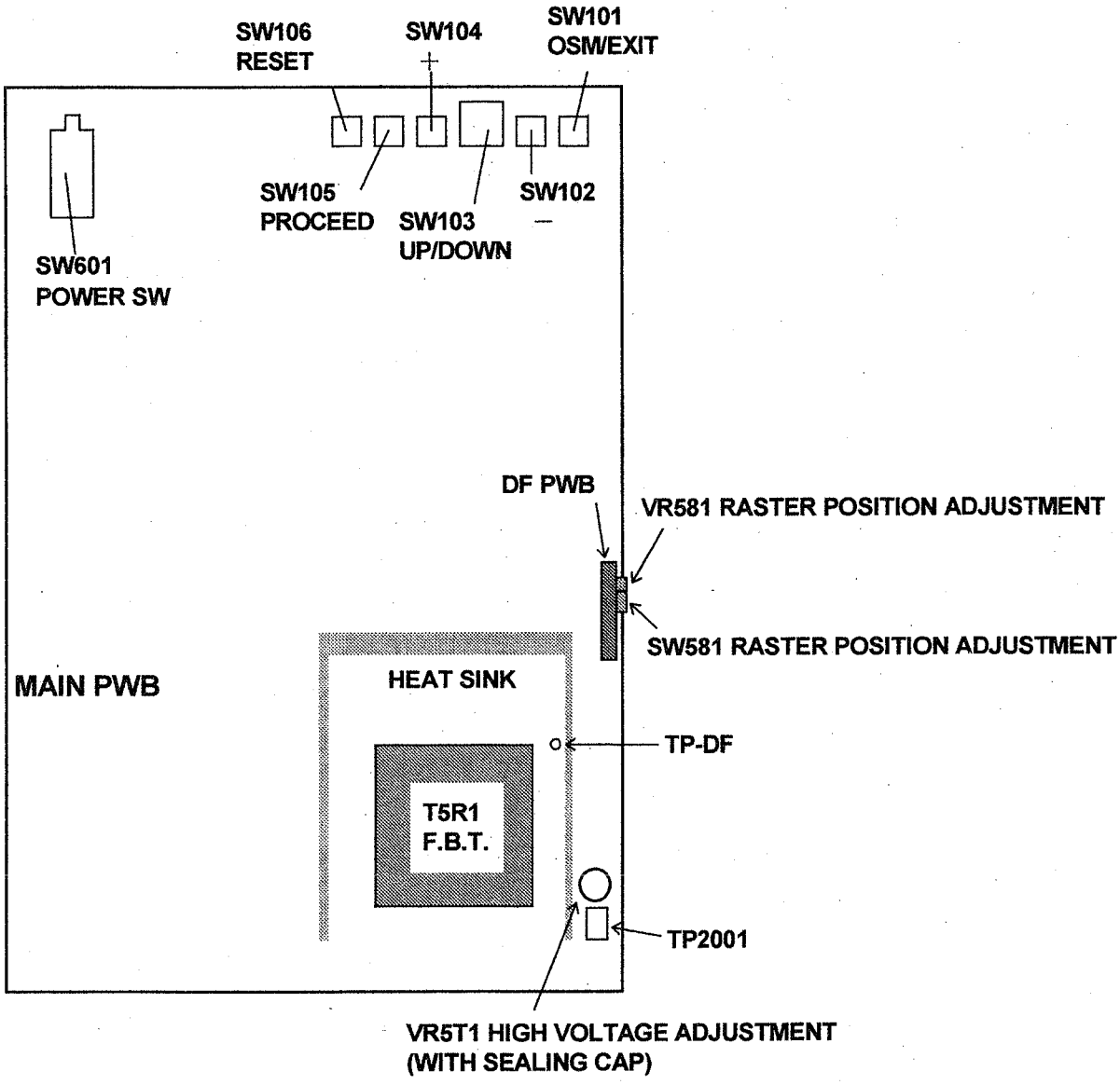


Fig 3-1 MAIN PWB (Parts Side)

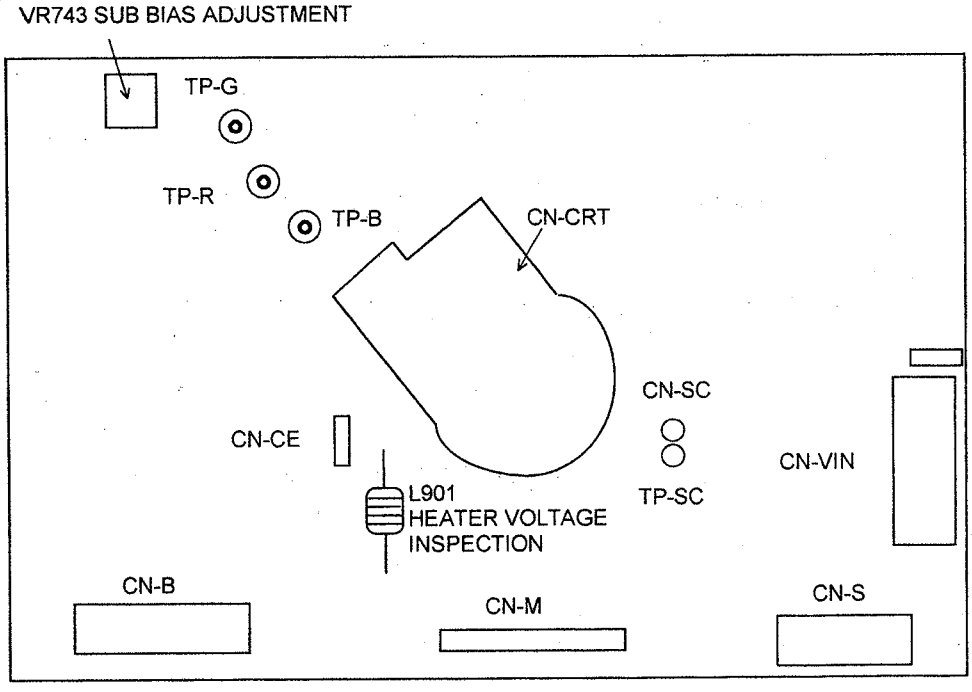


Fig 3-2 CRT PWB (Parts Side)

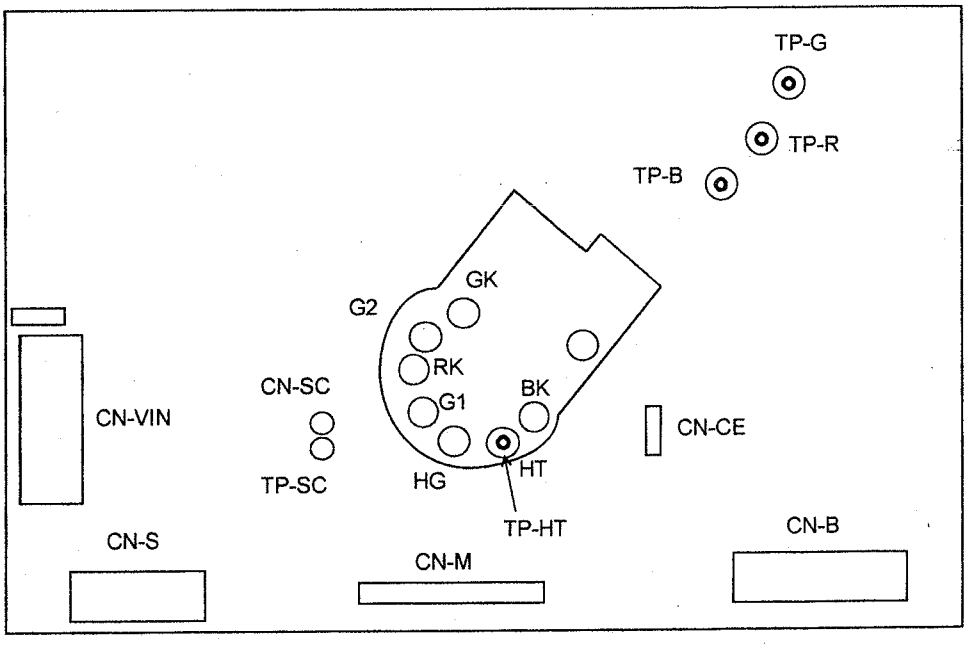


Fig 3-3 CRT PWB (Solder Side)

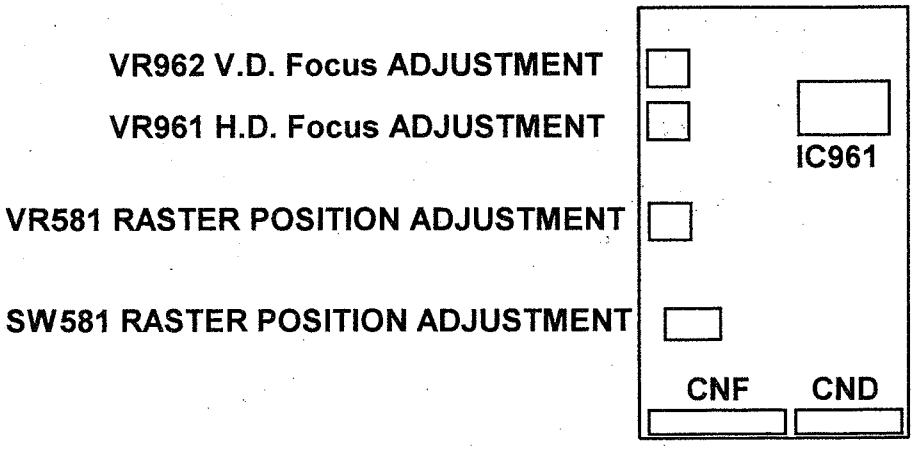


Fig 3-4 DF PWB (Parts Side)

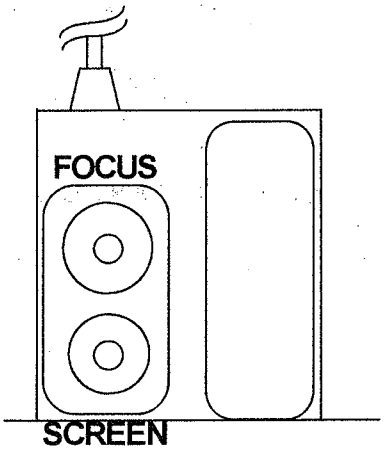


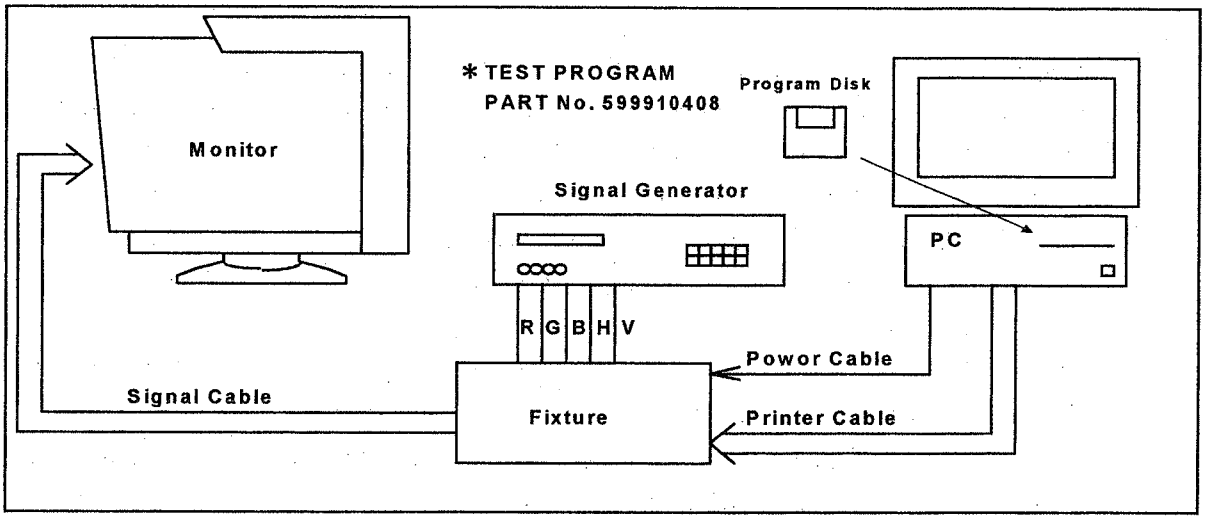
Fig 3-5 F.B.T. (T5R1) VR

INSPECTION

1. Inspection of PLUG & PLAY communication

1-1. A construction of System

This system should be connected as shown below.



1-2. Starting method

1) Input Signal

Input signal must be separate sync and two types of signals must be prepared.

One is the signal with vertical synchronization frequency of 42Hz, and another is the signal with vertical synchronization frequency of between 55Hz and 25kHz. Horizontal synchronization frequency should be set to reasonable value(example 31.5kHz).

2) Power ON procedure

- Power on PC and put the floppy disk for PnP Inspection into PC.
- Turn on Fixture.
- Make sure that fixture's LED flashes on and off.
- Turn on signal generator and monitor.

3) Starting PC Software

- Inspection of PnP communication

  To check the PnP communication for A700, EDID file name is A700.

  Type "P A700" on DOS command line and press return key.

- Writing EDID to EEPROM and inspection of PnP communication

  To write EDID to EEPROM and check the PnP communication of A700, type "WP A700" on DOS command line and press return key.

1-3. Operation

- The operation should be performed according to the screen message.
- When the message of "Please input Serial Number ." is displayed, type a serial number and hit return key. The message of "Input Serial Number is OK ?" is displayed. If the serial number is correct, press Y key, otherwise press N key and input the correct serial number. If you pressed Y key, the EDID data in which the serial number was edited is displayed. Check the data and press N key.
- When the message of "Please set Vsync to 42Hz." is displayed, set the signal generator to the signal with the vertical synchronization frequency of 42Hz. When the message of "Please set Vsync to over 55Hz." is displayed, set the signal generator to the signal with vertical synchronization frequency of between 55Hz and 25kHz.
- The message of "Normally Complete" means that the writing EDID data or PnP inspection was completed normally. "Error" message means that the writing EDID data or PnP inspection did not process correctly.
- When the PnP inspection is complete EDID data would be displayed and if the read EDID data differ from the original EDID data, the different bytes would be displayed in red.
- For the details of error messages, see the message displayed at the bottom right on the screen. The explanations of the messages are shown on section 4.
- After writing EDID data or inspection of DDC2B, monitor can not be communicated by DDC1. In this case, turn the monitor off and on. The DDC1 communication check can be performed again.
- Make sure that fixture's LED flashes on and off before writing EDID data and inspecting DDC1 and DDC2B. If the fixture's LED does not flash on and off, turn the monitor and the fixture off and then power them on again.

1-4. Error Messages

- **Start Bit Error**

  This message is displayed when the start bit is not "H" while sending data from PC to MPU on the fixture. This error will be caused by noise etc. on the line.
- **Command Error**

  This message is displayed when the different command is sent from PC to MPU on the fixture.
- **Hardware Error**

  This message means that the PC didn't recognize ACK command sent from the MPU on the fixture.
- **File Open Error**

  This message means that the input EDID file name is wrong.
- **Command line Switch Error**

  This message means that the input communication command is wrong.
- **Parity Error**

  This message is displayed when the MPU on the fixture recognized that the parity bit is incorrect. This error will be caused by noise etc. on the line.

- **EDID Data Error**

  This message is displayed when the null bit was not detected in EDID data read by DDC1 communication.

- **EDID Data Sort Error**

  This message is displayed when the header code was not detected in EDID data read by DDC1 communication.

- **Time Out Error**

  This message is displayed when the PC did not recognize ACK commands sent from MPU within 10 msec after PC had sent communication command or EDID data.

  If this error occurred, check the connection on PC, fixture, and monitor.

- **Data length is too short**

  This message is displayed when the input serial number is incomplete.

- **Data length is too long**

  This message is displayed when the input serial number has excessive numbers or letters.

1-5. EDID data file

An example of the EDID data file text is shown below. When you write or inspect EDID for a new monitor model that does not have a data file, create its data file according to the format shown below by using an editor software and save the file in an appropriate name to the floppy disk for PnP Inspection.

file name : A700

Table 1-5. Data list (Management number : EDID-058)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	D0	43	01	01	01	01
10	※1	※2	01	01	0C	20	18	78	E8	0D	92	A0	57	47	98	26
20	10	48	4F	FF	FE	80	31	59	45	59	61	59	71	4F	81	40
30	81	80	01	01	01	01	30	2A	00	98	51	00	2A	40	30	70
40	13	00	32	E6	10	00	00	1E	00	00	00	FD	00	37	78	1F
50	45	0C	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4E
60	45	43	20	41	37	30	30	0A	20	20	20	20	00	00	00	FF
70	00	※3	※3	※3	※3	※3	※3	※3	※3	※3	※3	※3	※3	※3	00	※4

EDID-058

※1 : address 10h manufactured month x 4

※2 : address 11h manufactured year - 1990

※3 : address 71h ~ 7Dh serial number (ASCII code)
add 0Ah following serial number and put 20h into remainder.

※4 : address 7Fh 1 byte check-sum a complement number of sum of address 00h ~ 7Eh

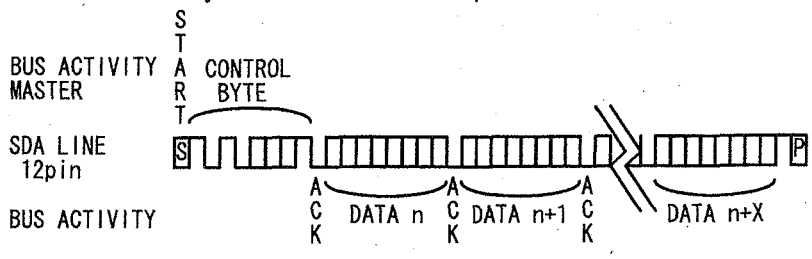


Fig 1-5 Timing chart of DDC2B

2. CRT

2-1. Inspection condition

(1) Inspection shall be made on white, red, green and blue rasters.
Following specifications must be met :

- Make sure that retrace lines are not visible.
- Measure the tube surface Brightness at the center of the screen, and confirm that the value is 34 cd/㎡ or greater.
- Receive All White, Make sure that the following color temperature specifications are satisfied:

$$x = 0.281 \pm 0.015$$
$$y = 0.311 \pm 0.015$$

(2) Inspection shall be made more than 60 cm away from the screen.
(3) The ambient brightness must be less than 5 lm/m², and in the non-operating condition, the screen may be viewed under white light of 700 to 1000 lm/m² at the tube face.
(4) The division of zone is shown in Fig 2-1.
(5) Equivalent diameter of defect is indicated in terms of (long dia. + short dia.)/2.

2-2. Phosphor quality

Phosphor quality classify in accordance with the following table.

Contrast	Defect types
High contrast	50% or more of the phosphor is missing by clogging, or missing red, green, blue phosphor, or dark dot and so on, High contrast defect by judgment of contrast comparator, and High contrast defect caused by neutral density filter standard.
Middle contrast	25% to less than 50% of the phosphor missing by clogging, or missing red, green, blue phosphor , or dark dot and so on, middle contrast defect by judgment of contrast comparator, and Middle contrast defect caused by neutral density filter standard.
Low contrast	Low contrast defect caused by neutral density filter standard.

2-3. Division of zone

A zone : 293 mm × 220 mm
B zone : In screen area except A zone.

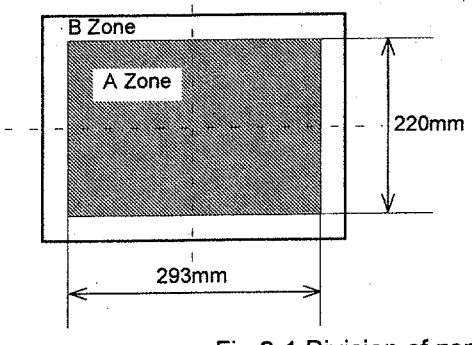


Fig 2-1 Division of zone

2-4. Limits

(1) High contrast defect

	dot clogging		Allowable number[pcs]				Minimum separation[mm]		
			A Zone	B Zone	SUM		A Zone	B Zone	SUM
A	2 adjacent dot(a same color)		0	2	2		-	50	-
B	1 trio		1	1	1		-	-	-
C	2 adjacent dot(a different color)		1	2	2		-	50	50
D	1 dot	green	3	2	5	8	50	20	20
		red	5	4	8				
		blue	5	4					
E	A+B+C+D						50	20	20

(2) Middle contrast defect

dot clogging	Allowable number[pcs]			Minimum separation[mm]		
	A Zone	B Zone	SUM	A Zone	B Zone	SUM
4 adjacent dot	0	0	0	-	-	-
3 adjacent dot	1	2	2	-	30	20
2 adjacent dot	2	5	5	30	20	20
1 dot	Less than ϕ 50mm, provided itisn't crowded					
	more than 5dots.					

(3) Low contrast defect

A Zone	Equivalent diameter of gathering of low contrast defect shall not exceed 13 mm.
B Zone	Equivalent diameter of gathering of low contrast defect shall not exceed 50 mm.

(4) CRT face plate defect

Scratches

Width [mm]	Allowable Length of a scratch [mm]	depth
Less than 0.05	unlimited	
0.06 to 0.13	Not more than 50 mm	
0.14 to 0.20	Not more than 19 mm	
More than 0.21	Not allow	

If the scratch can catch the edge of a finger nail, then it is to be rejected.

Valve and dull object defect

Division of Zone			A	B
Large fault	Blisters (a average diameter[mm])		0.51 to 0.70	
	Opaque spots and closed blisters (a average diameter[mm])		0.41 to 0.60	
	allowable	Division of Zone	1	1
		SUM	2	
Defect in a ϕ50mm	Minimum allowable separation[mm]		57	
	Blisters (a average diameter[mm])		0.25 to 0.50	
	Opaque spots and closed blisters (a average diameter[mm])		0.20 to 0.40	
	allowable	Division of Zone	2	
Elongated closed	Minimum allowable separation[mm]		12.7	
	Width[mm]		0.20 to 0.40	0.20 to 0.40
	Maximum length[mm]		4.0	6.0

Note 1 : Apply Defect in a ϕ 50 mm to Blisters and Minimum allowable separation items.

Note 2 : If elongated blisters number is less than maximum allowable number, calculate the average diameter. Then, apply Blisters defect specification in a ϕ 50 mm. Do not apply allowable number of zone Division spec, but apply minimum allowable separation and a limit of average diameter of large defects.

TROUBLE SHOOTING

Refer to the User Manual's trouble shooting section before using this chart.

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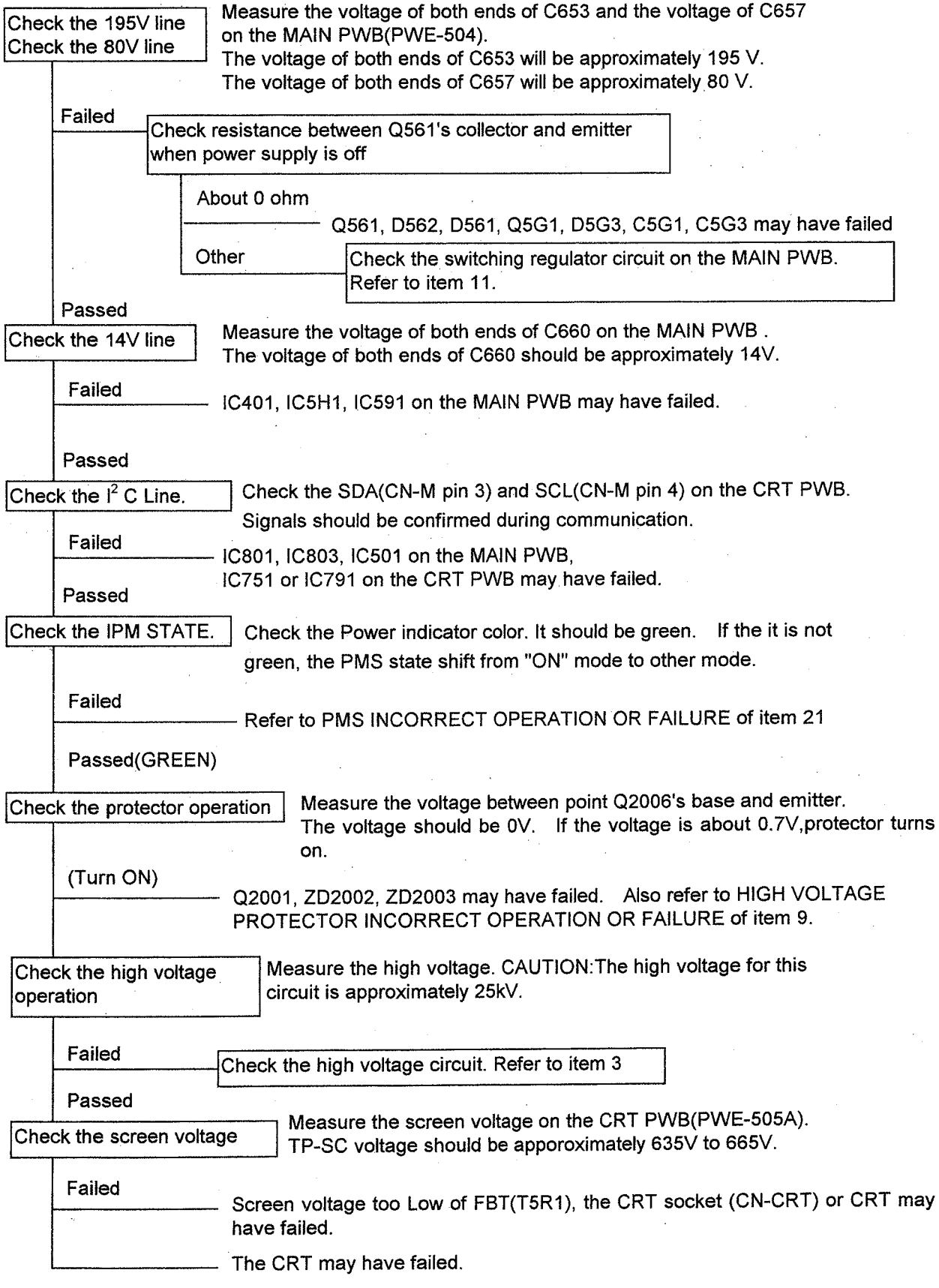
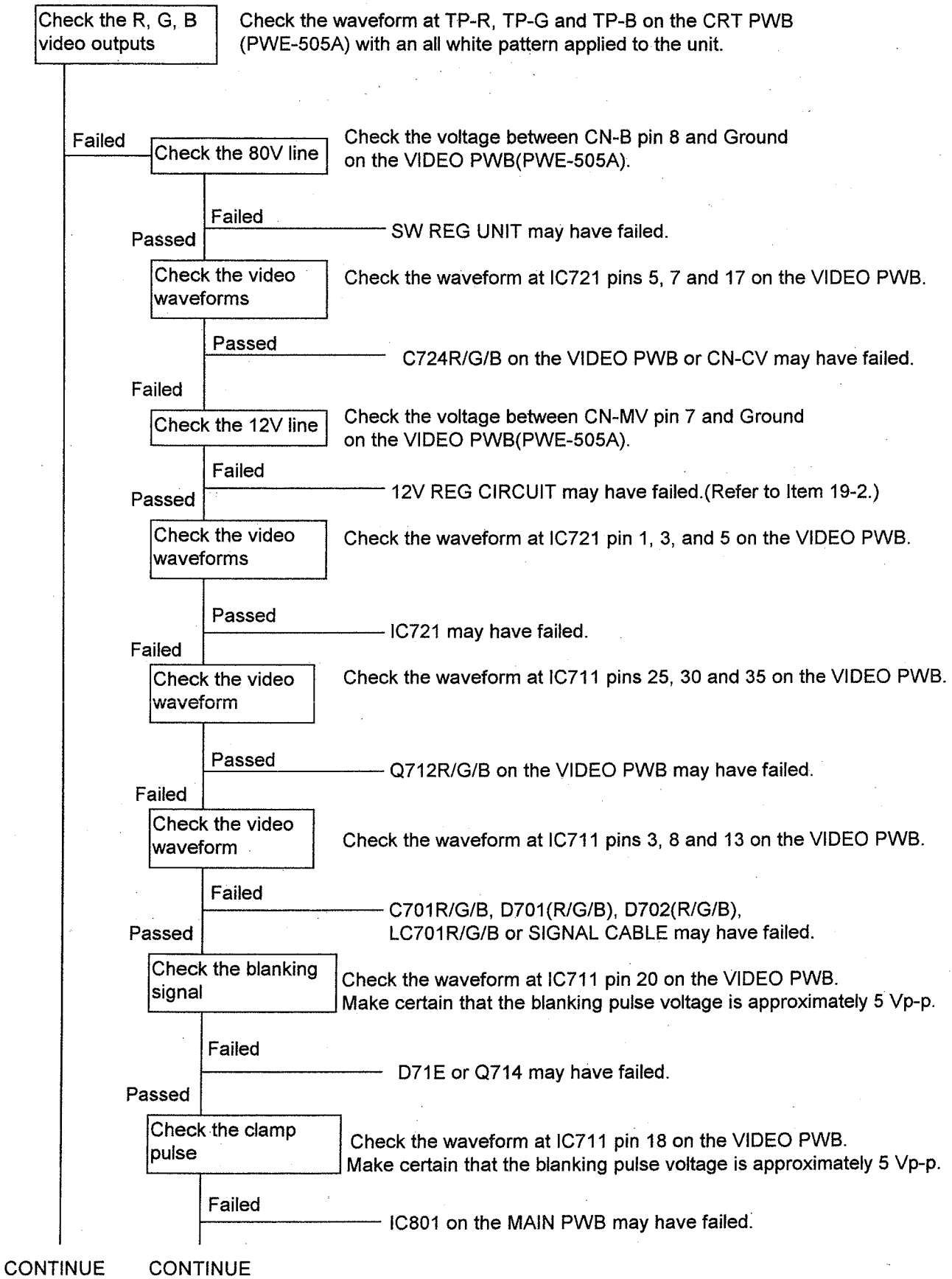
1. NO RASTER


Check the 195V line
Check the 80V line
Measure the voltage of both ends of C653 and the voltage of C657 on the MAIN PWB(PWE-504).
The voltage of both ends of C653 will be approximately 195 V.
The voltage of both ends of C657 will be approximately 80 V.
Failed
Check resistance between Q561's collector and emitter when power supply is off
About 0 ohm
Q561, D562, D561, Q5G1, D5G3, C5G1, C5G3 may have failed
Other
Check the switching regulator circuit on the MAIN PWB. Refer to item 11.
Passed
Check the 14V line
Measure the voltage of both ends of C660 on the MAIN PWB .
The voltage of both ends of C660 should be approximately 14V.
Failed
IC401, IC5H1, IC591 on the MAIN PWB may have failed.
Passed
Check the I2 C Line.
Check the SDA(CN-M pin 3) and SCL(CN-M pin 4) on the CRT PWB.
Signals should be confirmed during communication.
Failed
IC801, IC803, IC501 on the MAIN PWB,
IC751 or IC791 on the CRT PWB may have failed.
Passed
Check the IPM STATE.
Check the Power indicator color. It should be green. If the it is not green, the PMS state shift from "ON" mode to other mode.
Failed
Refer to PMS INCORRECT OPERATION OR FAILURE of item 21
Passed(GREEN)
Check the protector operation
Measure the voltage between point Q2006's base and emitter.
The voltage should be 0V. If the voltage is about 0.7V,protector turns on.
(Turn ON)
Q2001, ZD2002, ZD2003 may have failed. Also refer to HIGH VOLTAGE PROTECTOR INCORRECT OPERATION OR FAILURE of item 9.
Check the high voltage operation
Measure the high voltage. CAUTION:The high voltage for this circuit is approximately 25kV.
Failed
Check the high voltage circuit. Refer to item 3
Passed
Check the screen voltage
Measure the screen voltage on the CRT PWB(PWE-505A).
TP-SC voltage should be apporoximately 635V to 665V.
Failed
Screen voltage too Low of FBT(T5R1), the CRT socket (CN-CRT) or CRT may have failed.
The CRT may have failed.

2. ABNORMAL IMAGE OR RASTER BRIGHTNESS (Too dark or Too bright)


Check the R, G, B video outputs
Check the waveform at TP-R, TP-G and TP-B on the CRT PWB (PWE-505A) with an all white pattern applied to the unit.
Failed
Check the 80V line
Check the voltage between CN-B pin 8 and Ground on the VIDEO PWB(PWE-505A).
Failed
SW REG UNIT may have failed.
Passed
Check the video waveforms
Check the waveform at IC721 pins 5, 7 and 17 on the VIDEO PWB.
Passed
C724R/G/B on the VIDEO PWB or CN-CV may have failed.
Failed
Check the 12V line
Check the voltage between CN-MV pin 7 and Ground on the VIDEO PWB(PWE-505A).
Failed
12V REG CIRCUIT may have failed.(Refer to Item 19-2.)
Passed
Check the video waveforms
Check the waveform at IC721 pin 1, 3, and 5 on the VIDEO PWB.
Passed
IC721 may have failed.
Failed
Check the video waveform
Check the waveform at IC711 pins 25, 30 and 35 on the VIDEO PWB.
Passed
Q712R/G/B on the VIDEO PWB may have failed.
Failed
Check the video waveform
Check the waveform at IC711 pins 3, 8 and 13 on the VIDEO PWB.
Failed
C701R/G/B, D701(R/G/B), D702(R/G/B), LC701R/G/B or SIGNAL CABLE may have failed.
Passed
Check the blanking signal
Check the waveform at IC711 pin 20 on the VIDEO PWB.
Make certain that the blanking pulse voltage is approximately 5 Vp-p.
Failed
D71E or Q714 may have failed.
Passed
Check the clamp pulse
Check the waveform at IC711 pin 18 on the VIDEO PWB.
Make certain that the blanking pulse voltage is approximately 5 Vp-p.
Failed
IC801 on the MAIN PWB may have failed.
CONTINUE
CONTINUE

CONTINUE CONTINUE

Check the contrast control voltage

Check the contrast voltage at IC711 pin 17 on the VIDEO PWB. Make certain that the contrast voltage is approximately 4.2V, when the contrast is maximum.

Failed — CONTRAST USER CONTROL CIRCUIT may have failed. (Refer to Item 14-2.)

Passed — IC711 on the VIDEO PWB may have failed.

Passed

Check the R, G, B video outputs

Make certain that the voltages of Black level at TP-R/G/B on the CRT PWB are approximately 79-142V .

Failed

Check the 195V line

Make certain that the voltage between C76M positive lead and ground on the CRT PWB is approximately 195 V.

Failed — D762 on the VIDEO PWB or CN-B may have failed.

Passed — BRIGHTNESS USER CONTROL CIRCUIT may have failed. (Refer to Item 14-1.)

Check the high voltage operation

Measure the high voltage. Caution : The high voltage for this unit will average between 24.5 KV to 25.5 KV.

Failed — Check the high voltage circuit. Refer to item 3

Passed

Check the heater voltage

Measure the heater voltage on the CRT PWB. CN-M10 pin voltage should be approximately 6V.

Failed — Check the 6V regulator circuit (Q7F1,ZD7F1,R7F1) or Switching Regulator circuit on the MAIN PWB. Refer to item 11.Or CN-CV may have failed.

Passed

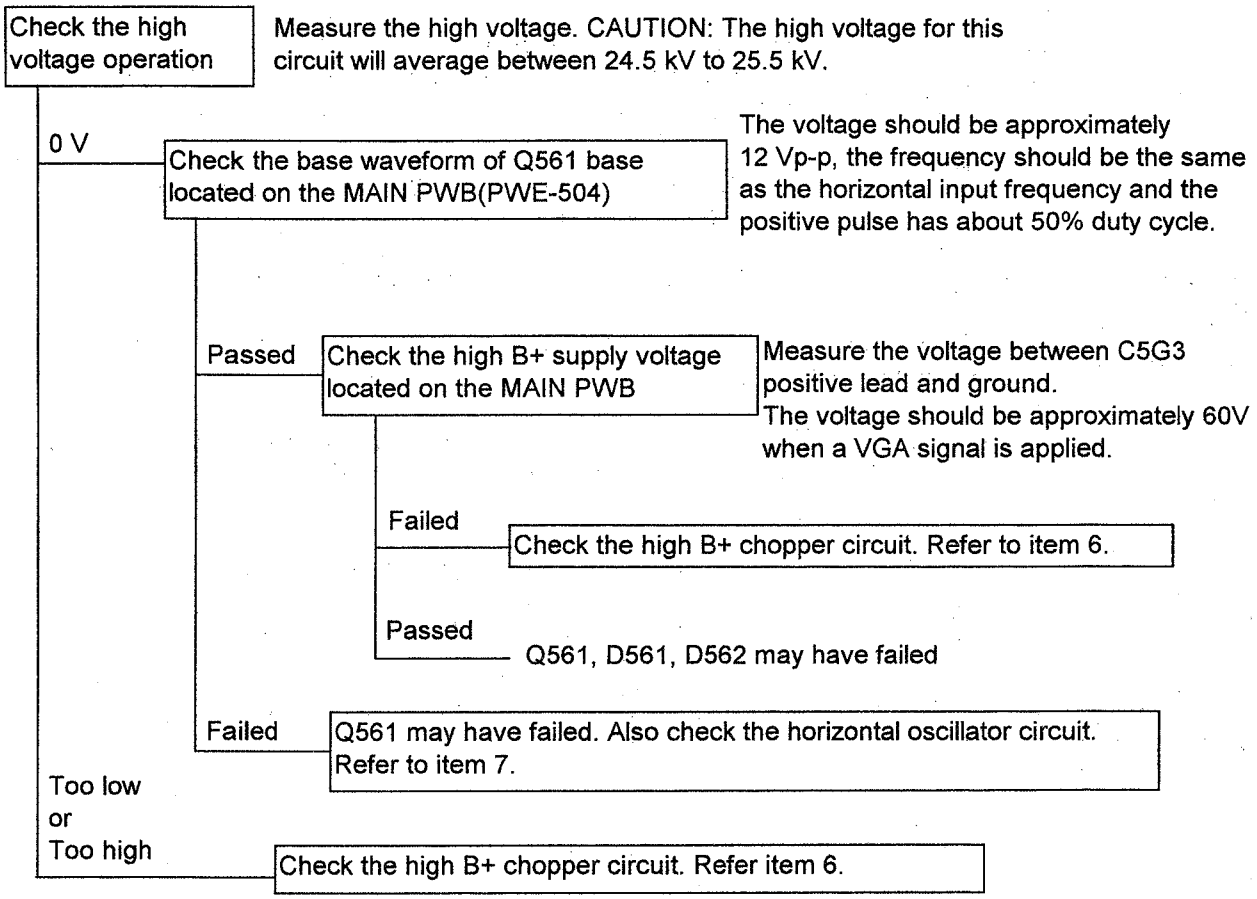
Check the screen control on the FBT

Measure the screen voltage on the CRT PWB. TP-SC voltage should be approximately 635V to 665V.

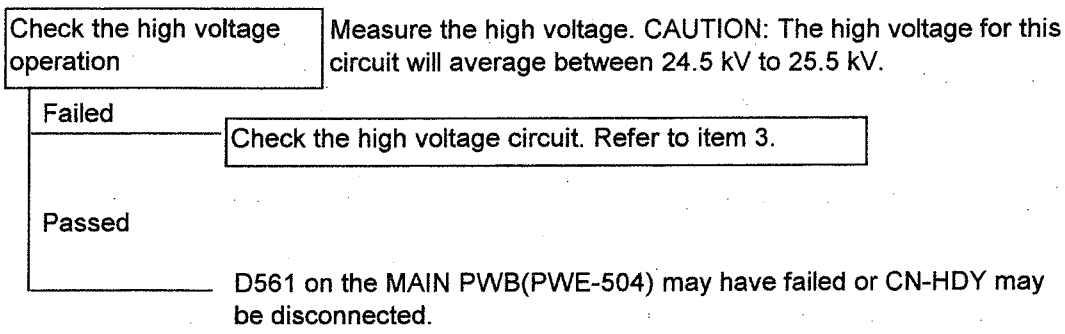
Too low — T5R1 on the MAIN PWB, CN-CRT on the CRT PWB or the CRT may have failed.

Passed — The CRT or CN-CRT may have failed.

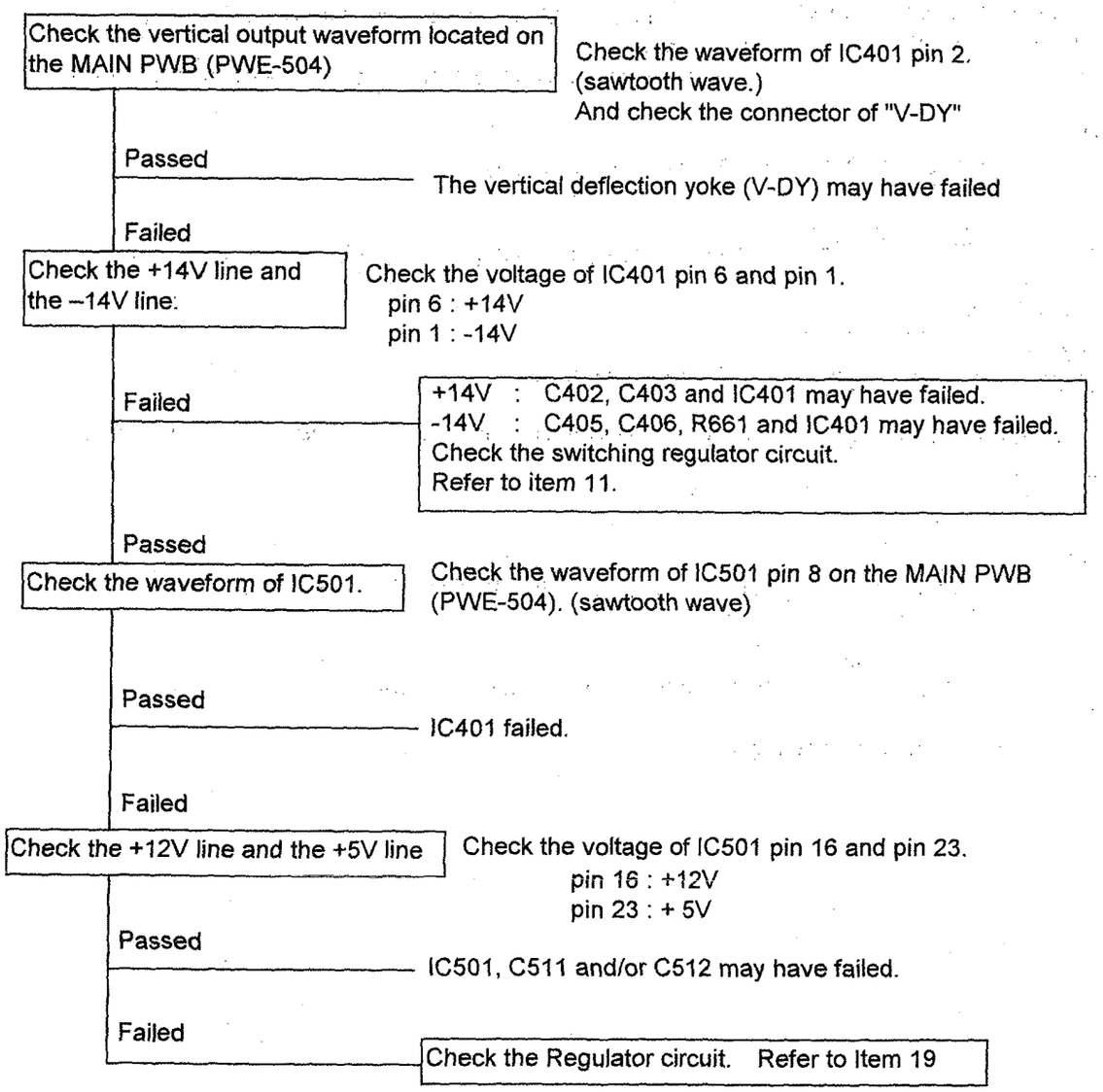
3. HIGH VOLTAGE FAILURE


Check the high voltage operation
Measure the high voltage. CAUTION: The high voltage for this circuit will average between 24.5 kV to 25.5 kV.
0 V
Check the base waveform of Q561 base located on the MAIN PWB(PWE-504)
The voltage should be approximately 12 Vp-p, the frequency should be the same as the horizontal input frequency and the positive pulse has about 50% duty cycle.
Passed
Check the high B+ supply voltage located on the MAIN PWB
Measure the voltage between C5G3 positive lead and ground.
The voltage should be approximately 60V when a VGA signal is applied.
Failed
Check the high B+ chopper circuit. Refer to item 6.
Passed
Q561, D561, D562 may have failed
Failed
Q561 may have failed. Also check the horizontal oscillator circuit. Refer to item 7.
Too low
or
Too high
Check the high B+ chopper circuit. Refer item 6.

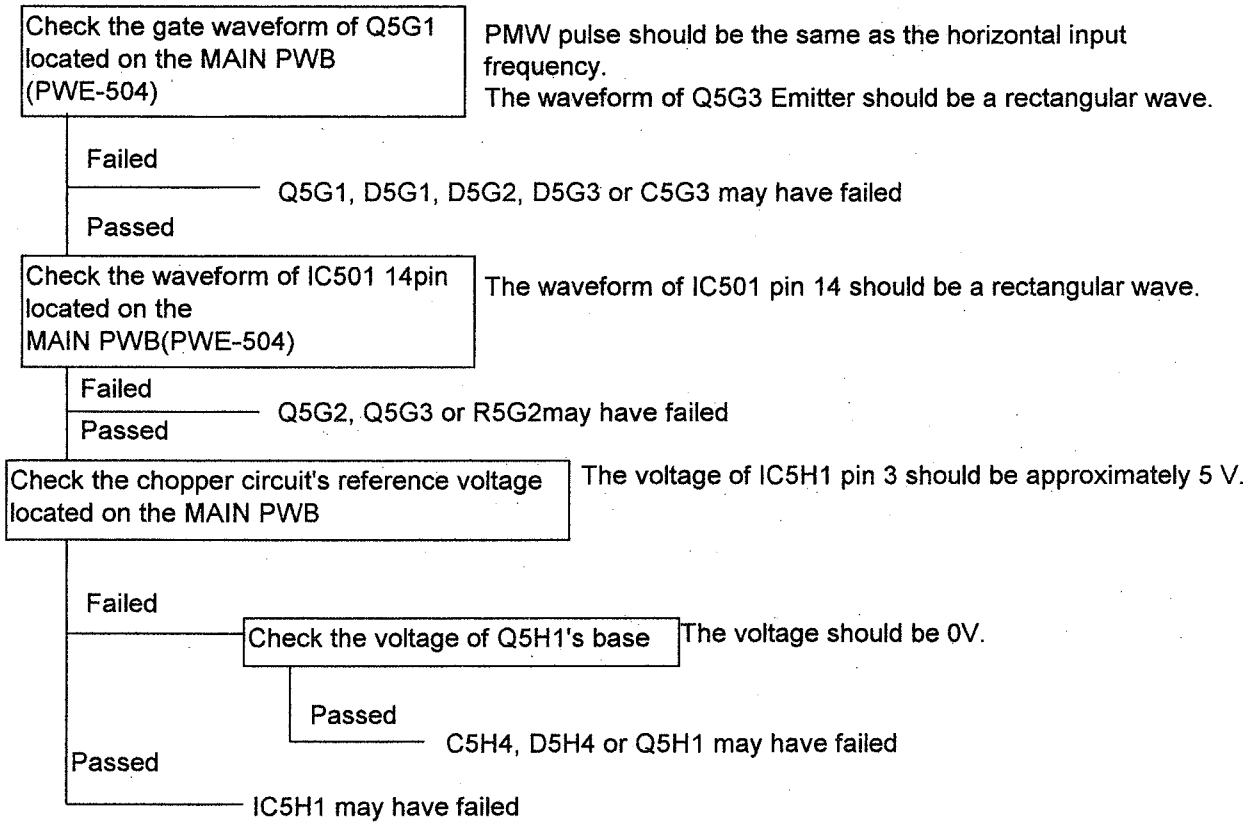
4. NO HORIZONTAL DEFLECTION


Check the high voltage operation
Measure the high voltage. CAUTION: The high voltage for this circuit will average between 24.5 kV to 25.5 kV.
Failed
Check the high voltage circuit. Refer to item 3.
Passed
D561 on the MAIN PWB(PWE-504) may have failed or CN-HDY may be disconnected.

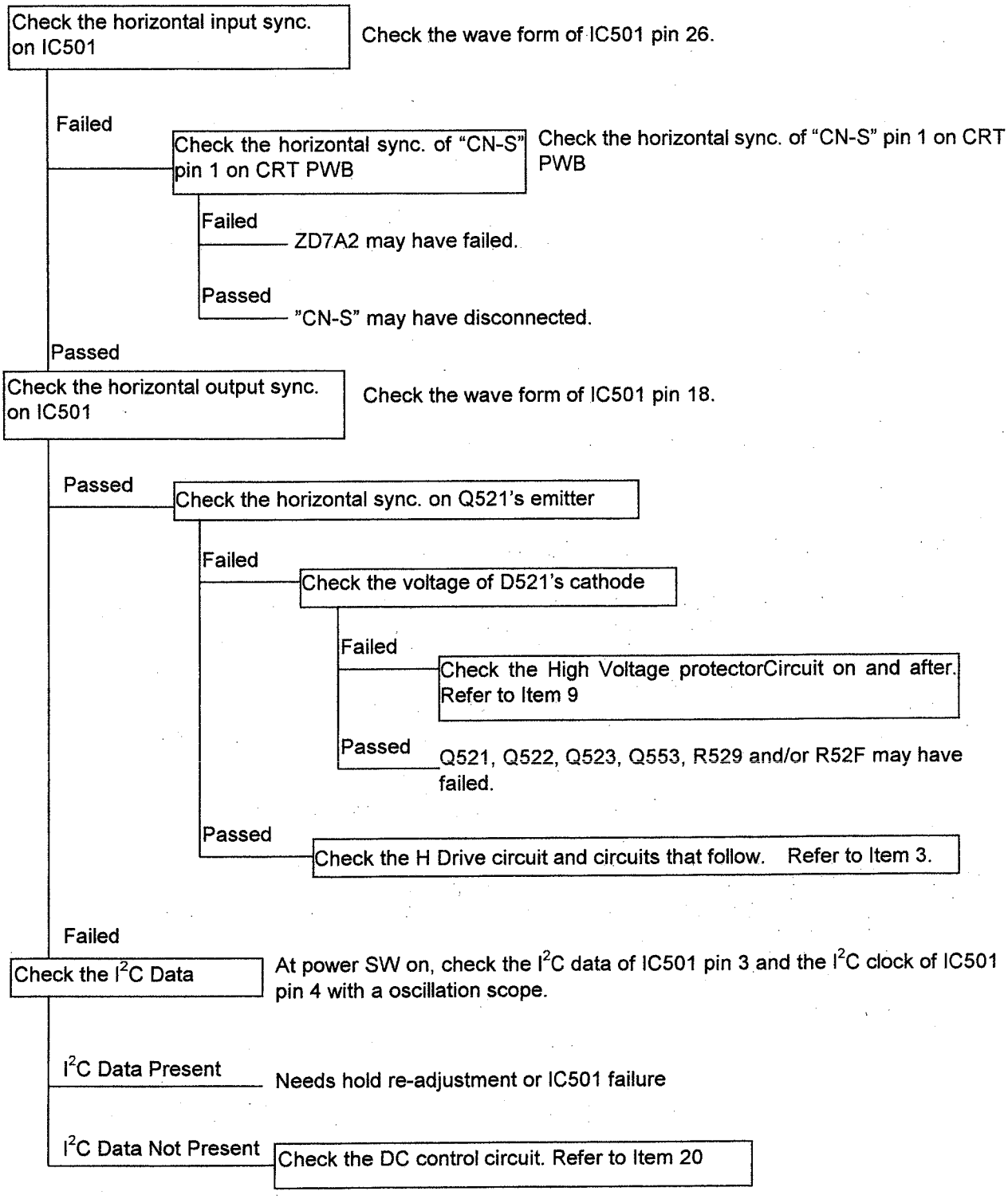
5. NO VERTICAL DEFLECTION


Check the vertical output waveform located on the MAIN PWB (PWE-504)
Check the waveform of IC401 pin 2. (sawtooth wave.)
And check the connector of "V-DY"
Passed
The vertical deflection yoke (V-DY) may have failed
Failed
Check the +14V line and the –14V line.
Check the voltage of IC401 pin 6 and pin 1.
pin 6 : +14V
pin 1 : -14V
Failed
+14V : C402, C403 and IC401 may have failed.
-14V : C405, C406, R661 and IC401 may have failed.
Check the switching regulator circuit.
Refer to item 11.
Passed
Check the waveform of IC501.
Check the waveform of IC501 pin 8 on the MAIN PWB (PWE-504). (sawtooth wave)
Passed
IC401 failed.
Failed
Check the +12V line and the +5V line
Check the voltage of IC501 pin 16 and pin 23.
pin 16 : +12V
pin 23 : + 5V
Passed
IC501, C511 and/or C512 may have failed.
Failed
Check the Regulator circuit. Refer to Item 19

6. HIGH +B CHOPPER CONTROL CIRCUIT OR THE DEFLECTION CIRCUIT +B FAILURE


Check the gate waveform of Q5G1 located on the MAIN PWB (PWE-504)
PMW pulse should be the same as the horizontal input frequency.
The waveform of Q5G3 Emitter should be a rectangular wave.
Failed
Q5G1, D5G1, D5G2, D5G3 or C5G3 may have failed
Passed
Check the waveform of IC501 14pin located on the MAIN PWB(PWE-504)
The waveform of IC501 pin 14 should be a rectangular wave.
Failed
Q5G2, Q5G3 or R5G2may have failed
Passed
Check the chopper circuit's reference voltage located on the MAIN PWB
The voltage of IC5H1 pin 3 should be approximately 5 V.
Failed
Check the voltage of Q5H1's base
The voltage should be 0V.
Passed
C5H4, D5H4 or Q5H1 may have failed
Passed
IC5H1 may have failed

7. UNSTABLE HORIZONTAL SYNCHRONIZATION


Check the horizontal input sync. on IC501
Check the wave form of IC501 pin 26.
Failed
Check the horizontal sync. of "CN-S" pin 1 on CRT PWB
Check the horizontal sync. of "CN-S" pin 1 on CRT PWB
Failed
ZD7A2 may have failed.
Passed
"CN-S" may have disconnected.
Passed
Check the horizontal output sync. on IC501
Check the wave form of IC501 pin 18.
Passed
Check the horizontal sync. on Q521's emitter
Failed
Check the voltage of D521's cathode
Failed
Check the High Voltage protectorCircuit on and after. Refer to Item 9
Passed
Q521, Q522, Q523, Q553, R529 and/or R52F may have failed.
Passed
Check the H Drive circuit and circuits that follow. Refer to Item 3.
Failed
Check the I2C Data
At power SW on, check the I2C data of IC501 pin 3 and the I2C clock of IC501 pin 4 with a oscillation scope.
I2C Data Present
Needs hold re-adjustment or IC501 failure
I2C Data Not Present
Check the DC control circuit. Refer to Item 20

8. UNSTABLE VERTICAL SYNCHRONIZATION

Check the vertical input sync. on IC501 — Check the wave form of IC501 pin 27 or pin 28.

- Passed — IC501 and/or C512 may have failed.
- Failed

Check the vertical sync. of "CN-S" pin 3 on CRT PWB — Check the vertical sync. of "CN-S" pin 3 on CRT PWB

- Passed — "CN-S" may have disconnected. IC801 and/or Q801 may have failed
- Failed — ZD7A1 may have failed.

9. HIGH VOLTAGE PROTECTOR INCORRECT OPERATION OR FAILURE

Before you check the voltage of Q5F1 collector and Q2001 collector, the power switch (SW1) should be turned OFF and ON again, (wait a few seconds after power on)

Check the voltage of Q5F1 collector on the MAIN PWB(PWE-504) — The voltage should be 0 volts. If the voltage is near 195V, protector turns on.

- Failed — Q5F1, R5F1, R5F2, C5F1, T5R1 may have failed
- Passed

Check the voltage of Q2001 collector on the MAIN PWB, when contrast and bright controls is set to minimum. — The voltage should be 0 V. If the voltage about 14.0 V, protector turns on.

- Failed — Q2001, ZD2002 or T5R1 may have failed.
- Passed — D2002, ZD2001 or Q2002, Q2003 may have failed.

10. DISTORTION FAILURE

10-1. SIDE PINCUSHION AND VERTICAL TRAPEZOID DISTORTION CONTROL CIRCUIT FAILURE

Check the parabolic waveform.

Check the waveform of IC501 pin 9 at VGA480 on the MAIN PWB.

about 0.2Vp-p

Passed → Check the horizontal image size circuit. Refer to item 12-1.

Failed → Check the Side Pincushion control circuit. Refer to item 14-7.

10-2. PARALLELOGRAM DISTORTION CONTROL CIRCUIT FAILURE

Check the voltage of IC502 pin 7

Check the voltage at IC502 pin 7 on MAIN PWB (PWE-504) is approx. 4.0V.

Passed → IC502 failure

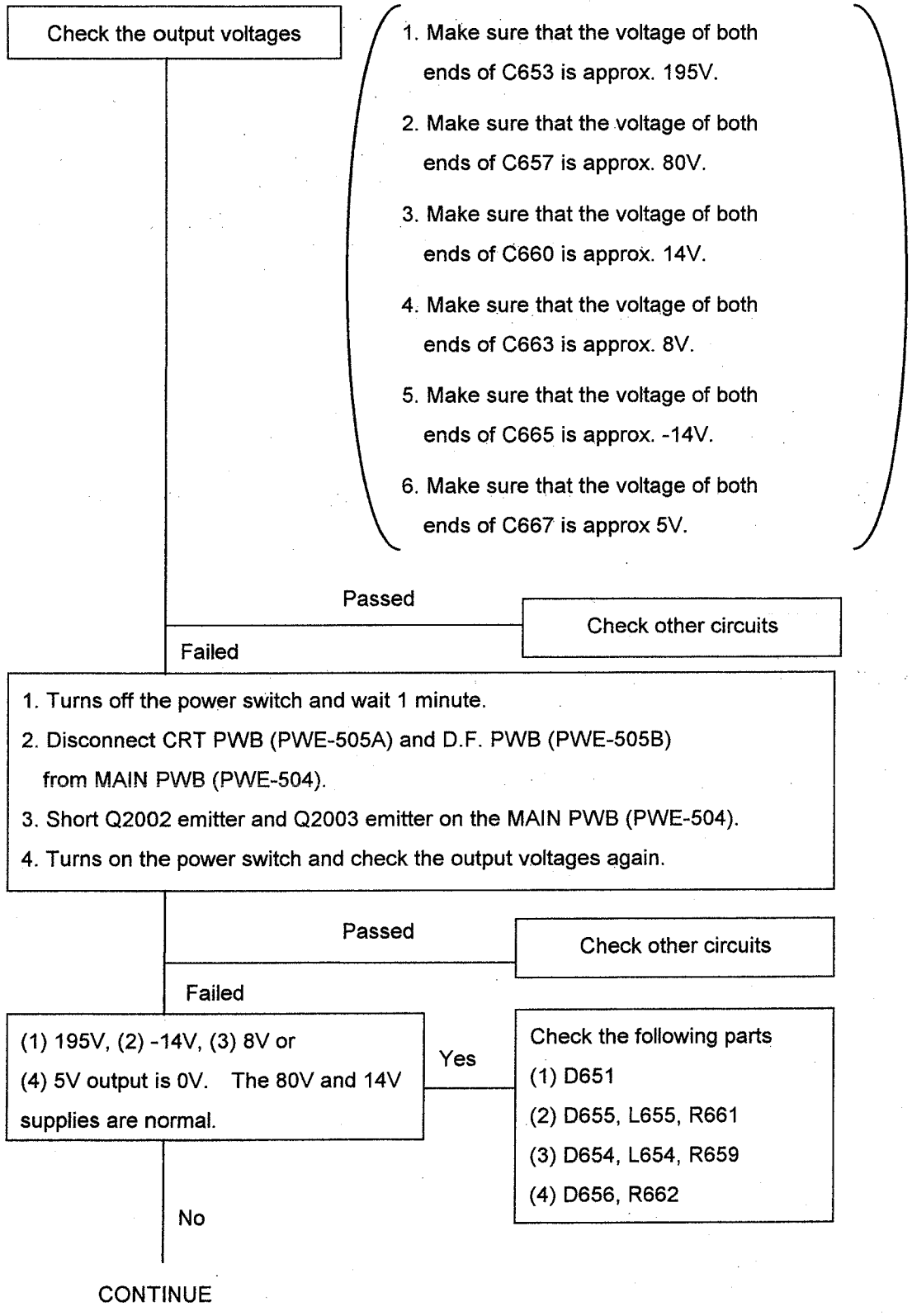
Failed → Check the voltage of IC501.

Check the voltage at IC501 pin 14 is approx. 2.5V

Passed → IC502 may have failed.

Failed → IC501 may have failed.

11. SWITCHING REGULATOR CIRCUIT FAILURE


Check the output voltages
1. Make sure that the voltage of both ends of C653 is approx. 195V.
2. Make sure that the voltage of both ends of C657 is approx. 80V.
3. Make sure that the voltage of both ends of C660 is approx. 14V.
4. Make sure that the voltage of both ends of C663 is approx. 8V.
5. Make sure that the voltage of both ends of C665 is approx. -14V.
6. Make sure that the voltage of both ends of C667 is approx 5V.
Passed
Check other circuits
Failed
1. Turns off the power switch and wait 1 minute.
2. Disconnect CRT PWB (PWE-505A) and D.F. PWB (PWE-505B) from MAIN PWB (PWE-504).
3. Short Q2002 emitter and Q2003 emitter on the MAIN PWB (PWE-504).
4. Turns on the power switch and check the output voltages again.
Passed
Check other circuits
Failed
(1) 195V, (2) -14V, (3) 8V or (4) 5V output is 0V. The 80V and 14V supplies are normal.
Yes
Check the following parts
(1) D651
(2) D655, L655, R661
(3) D654, L654, R659
(4) D656, R662
No
CONTINUE

CONTINUE

When the power switch turns on, the voltage of both ends of C627 changes repeatedly from 10V to 17V.

Yes

Check the following parts
D602, D651, D652, D653, IC621, IC671 C610, C611, C632, C653, C657, C660, C630, R620, R624, R643, R645, T601,

No

All outputs are 0V. And when the power switch turns on, the voltage of both ends of C627 increases to about 17V momentarily and become 0V.

Yes

Check the following parts
IC671, Q631,Q633, PC603, ZD628, R671, D652, D653, T601,

No

All outputs are 0V. And when the power switch turns on, the voltage of both ends of C627 is within the range of 0V to 17V.

Yes

Check the following parts
D621, D622, ZD628, Q627, Q628, Q631, Q633, PC601, C627, C628, IC621, ZD628,

No

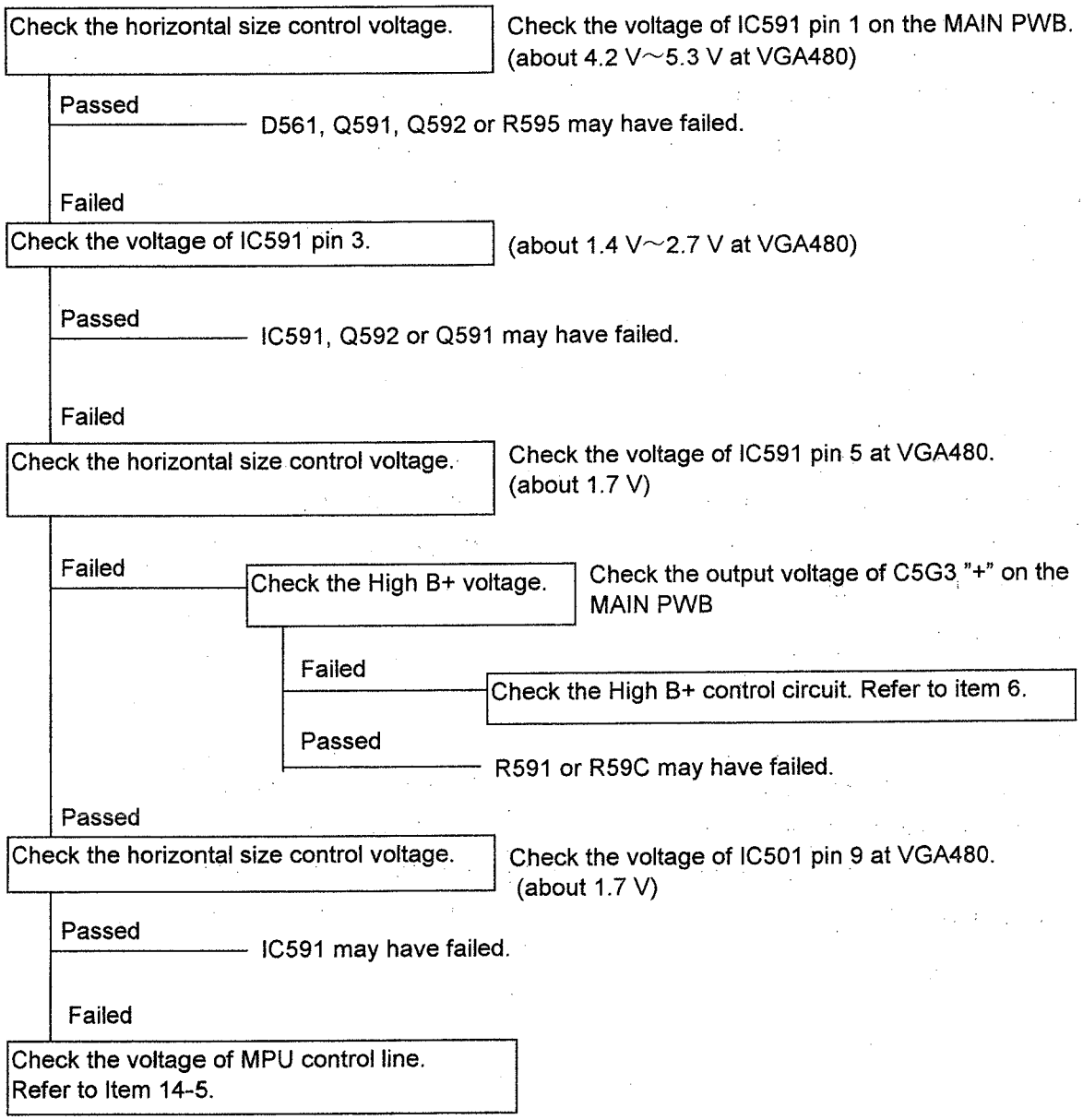
Fuse F601 is open.

Yes

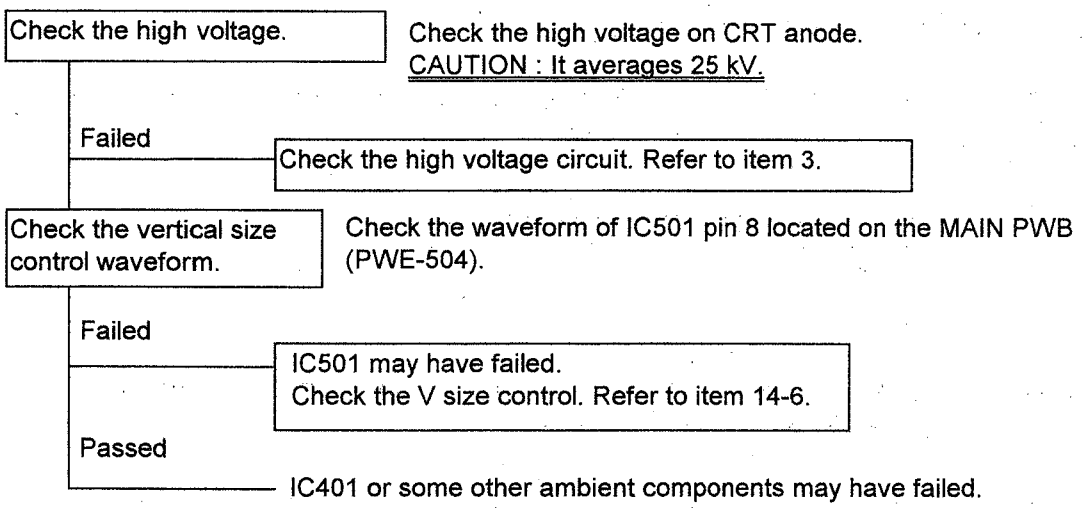
Check the following parts
D601, C609, Q601, ZD601, R607, IC621, C629

12. IMAGE SIZE FAILURE

12-1. HORIZONTAL IMAGE SIZE FAILURE OR ABNORMAL FUNCTION


Check the horizontal size control voltage.
Check the voltage of IC591 pin 1 on the MAIN PWB. (about 4.2 V~5.3 V at VGA480)
Passed
D561, Q591, Q592 or R595 may have failed.
Failed
Check the voltage of IC591 pin 3.
(about 1.4 V~2.7 V at VGA480)
Passed
IC591, Q592 or Q591 may have failed.
Failed
Check the horizontal size control voltage.
Check the voltage of IC591 pin 5 at VGA480. (about 1.7 V)
Failed
Check the High B+ voltage.
Check the output voltage of C5G3 "+" on the MAIN PWB
Failed
Check the High B+ control circuit. Refer to item 6.
Passed
R591 or R59C may have failed.
Passed
Check the horizontal size control voltage.
Check the voltage of IC501 pin 9 at VGA480. (about 1.7 V)
Passed
IC591 may have failed.
Failed
Check the voltage of MPU control line. Refer to Item 14-5.

12-2. VERTICAL IMAGE SIZE FAILURE OR ABNORMAL OPERATION


Check the high voltage.
Check the high voltage on CRT anode.
CAUTION : It averages 25 kV.
Failed
Check the high voltage circuit. Refer to item 3.
Check the vertical size control waveform.
Check the waveform of IC501 pin 8 located on the MAIN PWB (PWE-504).
Failed
IC501 may have failed.
Check the V size control. Refer to item 14-6.
Passed
IC401 or some other ambient components may have failed.

13. IMAGE POSITION CONTROL FAILURES

13-1. HORIZONTAL IMAGE POSITION CONTROL FAILURE

Check the back raster position. — Input signal 1024*768(75) and check whether or not the back raster position can be centered.

Passed — Check the H position control. Refer to item 14-3.

IC501 failure

Failed

Check the raster control operation — Make certain that the image position is adjusted when the horizontal centering control(VR581) is used.

Check the raster control operation voltage. — The voltage of CN-DF pin 4-5 located on the MAIN PWB (PWE-504) should be approx. 5V.

Passed — Q581 or C581 may have failed.

Failed — Q581, C581, VR581, C667, C668, D656 or ZD651 may have failed.

Passed — Adjust the horizontal position control again.

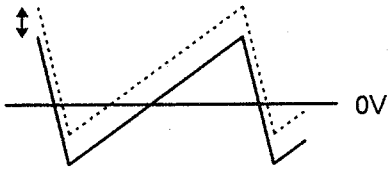
13-2. VERTICAL IMAGE POSITION CONTROL FAILURE

Check the vertical position control voltage. — Check the voltage of IC531 pin 13 located on the MAIN PWB (PWE-504). It should change from 1(V) to 4(V), when the vertical position control is used.

Failed — Check the V size control. Refer to item 14-6.

Passed

Check the sawtooth wave on IC402. — Check the waveform of IC402 pin 7 located on the MAIN PWB (PWE-504) . It should move up/down, when vertical position control is used.



Failed — IC401 and IC402 may have failed.

Passed — IC401 may have failed.

14. USER CONTROL FAILURE

14-1. BRIGHTNESS USER CONTROL FAILURE

Check the brightness control voltage.

The IC751 pins 15 voltage on the VIDEO PWB (PWE-505A) should decrease when the OSM brightness bar is increased and increase when the OSM brightness bar is decreased.

- Failed → IC751 may have failed.
- Passed

Check the brightness control voltage.

The voltage on the emitter of Q743R/G/B located on the VIDEO PWB (PWE-505A) should decrease when the OSM brightness bar is increased and increase when the OSM brightness bar is decreased.

- The brightness does not change for all colors (Red, Green, Blue) → ZD741, D762 or C76M on the VIDEO PWB (PWE-505A) may have failed.
- The brightness does not change for the Red color. → Q743R, Q744R, or D742R may have failed.
- The brightness does not change for the Green color. → Q743G, Q744G or D742G may have failed.
- The brightness does not change for the Blue color. → Q743B, Q744B, or D742B may have failed.

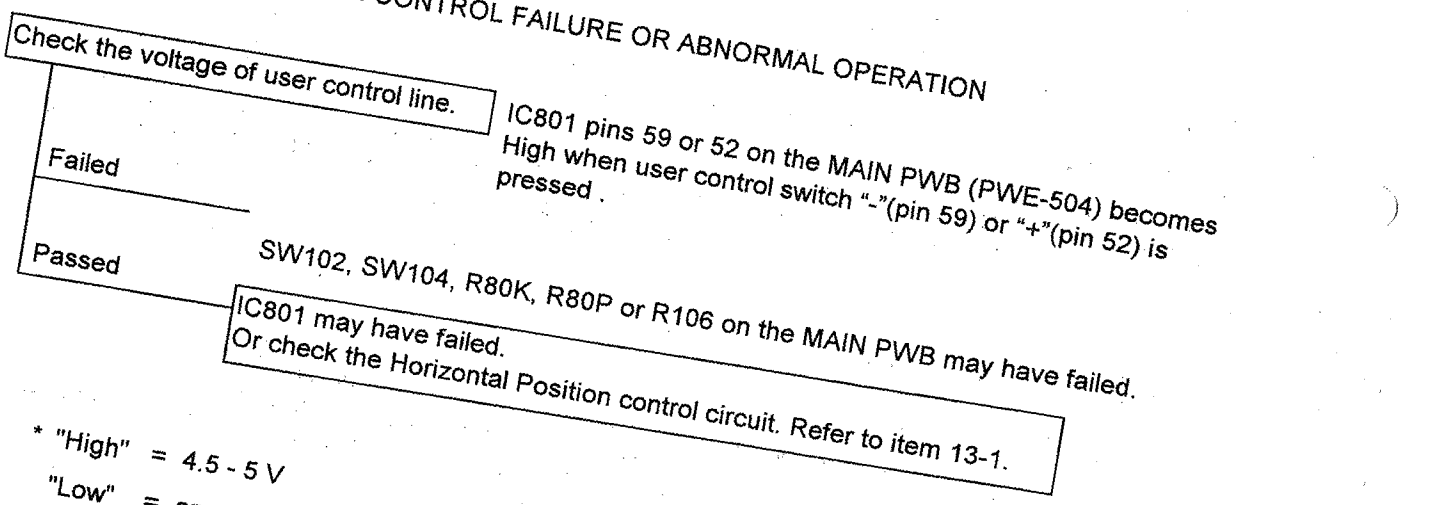
14-2. CONTRAST USER CONTROL FAILURE

Check the contrast control's voltage.

The voltage of IC711 pin 17 on the VIDEO PWB (PWE-505A) should increase when the contrast control bar is increased and decrease when the control bar is decreased .

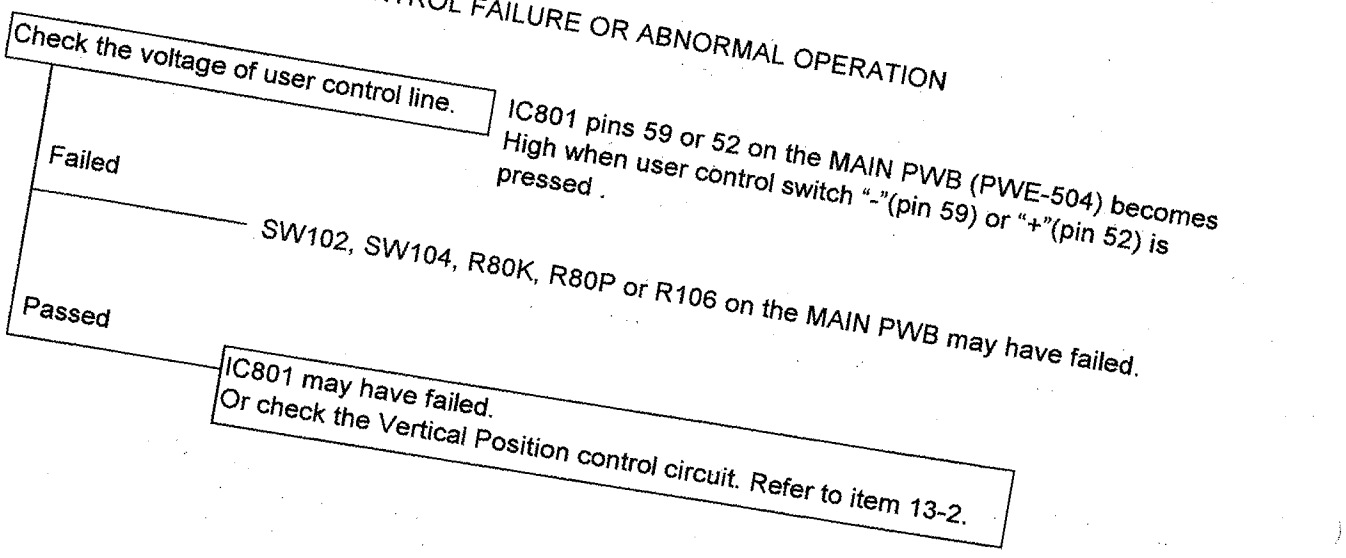
- Passed → IC711 may have failed.
- Failed → IC751 on the VIDEO PWB (PWE-505A), may have failed.

14-3. HORIZONTAL POSITION CONTROL FAILURE OR ABNORMAL OPERATION


Check the voltage of user control line.
IC801 pins 59 or 52 on the MAIN PWB (PWE-504) becomes High when user control switch "-"(pin 59) or "+"(pin 52) is pressed .
Failed
Passed
SW102, SW104, R80K, R80P or R106 on the MAIN PWB may have failed.
IC801 may have failed.
Or check the Horizontal Position control circuit. Refer to item 13-1.

* "High" = 4.5 - 5 V
"Low" = approximately 0V

14-4. VERTICAL POSITION CONTROL FAILURE OR ABNORMAL OPERATION


Check the voltage of user control line.
IC801 pins 59 or 52 on the MAIN PWB (PWE-504) becomes High when user control switch "-"(pin 59) or "+"(pin 52) is pressed .
Failed
Passed
SW102, SW104, R80K, R80P or R106 on the MAIN PWB may have failed.
IC801 may have failed.
Or check the Vertical Position control circuit. Refer to item 13-2.

14-5. HORIZONTAL SIZE CONTROL FAILURE OR ABNORMAL OPERATION

Check the Horizontal Size Control voltage.

The voltage of IC501 pin 9 on the MAIN PWB should change when adjusting horizontal size by user control SW. (range of about 1.5V to 1.8V at VGA480)

Passed → Check the Horizontal Size control circuit. Refer to item 12-1.

Failed

Check the voltage of MPU control line.

IC501 pin 11 on the MAIN PWB becomes High(MAX 5 V) when control SW + is pressed at "H.SIZE MAX" in SERVICE MENU .

Failed → R531, or R801 or IC801 on the MAIN PWB may have failed.

Passed → IC501 may have failed.

14-6. VERTICAL SIZE CONTROL FAILURE OR ABNORMAL OPERATION

Check the voltage of user control line.

IC801 pins 59 or 52 on the MAIN PWB (PWE-504) becomes High when user control switch "-"(pin 59) or "+"(pin 52) is pressed .

Failed → SW102, SW104, R80K, R80P or R106 on the MAIN PWB may have failed.

Passed → IC801 may have failed.
Or check the Vertical Size control circuit. Refer to item 12-2.

14-7. SIDE PINCUSHION CONTROL FAILURE OR ABNORMAL OPERATION

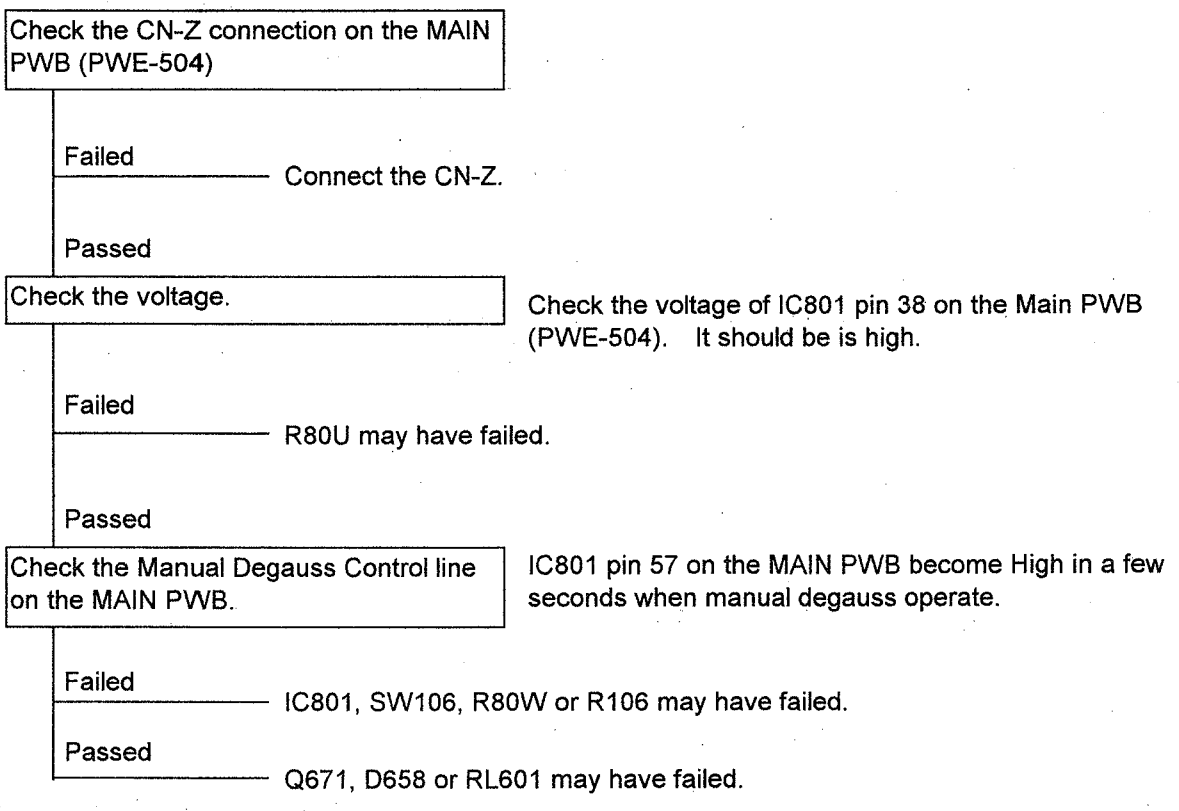
Check the wave form of Side Pincushion Control.

The wave form of IC501 pin 9 on the MAIN PWB should change when adjusting SIDE PINCUSHION by user control SW.

Passed → Check the Side Pincushion control circuit. Refer to item 10-1.

Failed → IC501 may have failed.

14-8. MANUAL DEGAUSS FAILURE


Check the CN-Z connection on the MAIN PWB (PWE-504)
Failed
Connect the CN-Z.
Passed
Check the voltage.
Check the voltage of IC801 pin 38 on the Main PWB (PWE-504). It should be is high.
Failed
R80U may have failed.
Passed
Check the Manual Degauss Control line on the MAIN PWB.
IC801 pin 57 on the MAIN PWB become High in a few seconds when manual degauss operate.
Failed
IC801, SW106, R80W or R106 may have failed.
Passed
Q671, D658 or RL601 may have failed.

15. ABNORMAL WHITE BALANCE

Readjust white balance. — Refer to the adjustment procedures.

- Passed — OK
- Failed at all modes — Check the Video circuit. Refer to item 2

16. BLANKING CIRCUIT FAILURE (Retrace lines are visible on the back raster)

Check the G1 waveform. — Check the waveform of C4E3 negative lead on the CRT PWB (PWE-505A). The waveform should have a horizontal a vertical frequency pulse.

- Passed — CRT, CN-CRT on the CRT PWB(PWE-505A) may have failed. Or TP-SC on the CRT PWB voltage may be too high.
- Failed

Check the blanking pulse. — Check the collector waveform of Q4E3 on the VIDEO PWB.

- Passed — D782, D4E4 or D4E3 may have failed .
- Failed

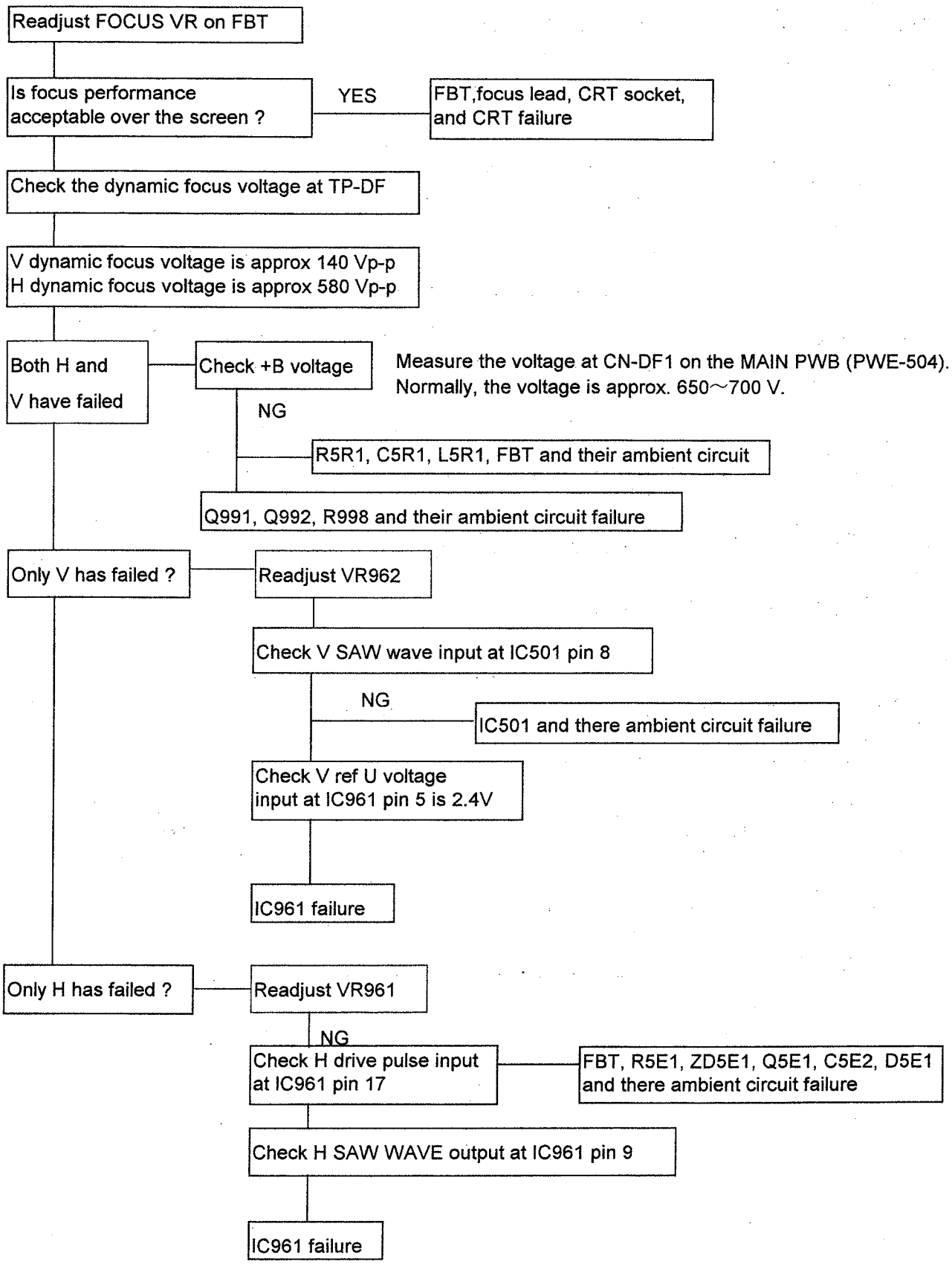
Check the blanking pulse. — Check the base waveform of Q4E3.

- Passed — Q4E3 may have failed.
- Failed

Check the vertical deflection waveform. — Check the waveform of CN-M pin 12 on the MAIN PWB.

- Passed — D4E6, Q4E3 or CN-M may have failed.
- Failed — IC401 located on the MAIN PWB (PWE-504) may have failed.

17. POOR FOCUS


Readjust FOCUS VR on FBT
Is focus performance acceptable over the screen ?
YES
FBT,focus lead, CRT socket, and CRT failure
Check the dynamic focus voltage at TP-DF
V dynamic focus voltage is approx 140 Vp-p
H dynamic focus voltage is approx 580 Vp-p
Both H and V have failed
Check +B voltage
Measure the voltage at CN-DF1 on the MAIN PWB (PWE-504).
Normally, the voltage is approx. 650~700 V.
NG
R5R1, C5R1, L5R1, FBT and their ambient circuit
Q991, Q992, R998 and their ambient circuit failure
Only V has failed ?
Readjust VR962
Check V SAW wave input at IC501 pin 8
NG
IC501 and there ambient circuit failure
Check V ref U voltage input at IC961 pin 5 is 2.4V
IC961 failure
Only H has failed ?
Readjust VR961
NG
Check H drive pulse input at IC961 pin 17
FBT, R5E1, ZD5E1, Q5E1, C5E2, D5E1 and there ambient circuit failure
Check H SAW WAVE output at IC961 pin 9
IC961 failure

18. POOR LINEARITY

18-1. HORIZONTAL LINEARITY FAILURE

Check the horizontal frequency band selector. — Check the voltage of IC801 pins 43, 44, 45 and 46 on the MAIN PWB (PWE-504).

- Failed — IC801 on the MAIN PWB may have failed.
- Passed — D572, D573, D574, D575, Q571～Q578 on the MAIN PWB may have failed.

FH BAND

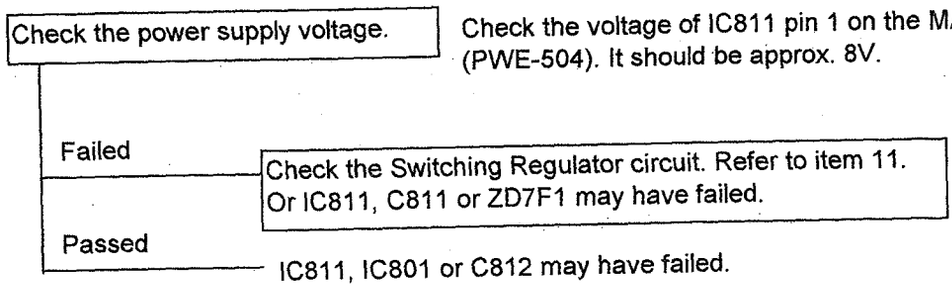
Frequency (kHz)	fH 1 Pin46	fH 2 Pin45	fH 3 Pin44	fH 4 Pin43
fH ≦ 30.0	H	H	L	L
30.0 < fH ≦ 34.0	L	L	L	H
34.0 < fH ≦ 36.5	L	H	L	H
36.5 < fH ≦ 40.0	L	H	H	H
40.0 < fH ≦ 44.0	H	L	L	H
44.0 < fH ≦ 47.5	H	L	H	H
47.5 < fH ≦ 51.0	H	H	L	L
51.0 < fH ≦ 55.0	H	H	L	H
55.0 < fH ≦ 59.0	H	H	H	L
59.0 < fH ≦ 62.0	H	H	H	L
62.0 < fH ≦ 67.0	H	H	H	L
67.0 < fH ≦ 69.0	H	H	H	H
69.0 < fH	H	H	L	L

18-2. VERTICAL LINEARITY FAILURE

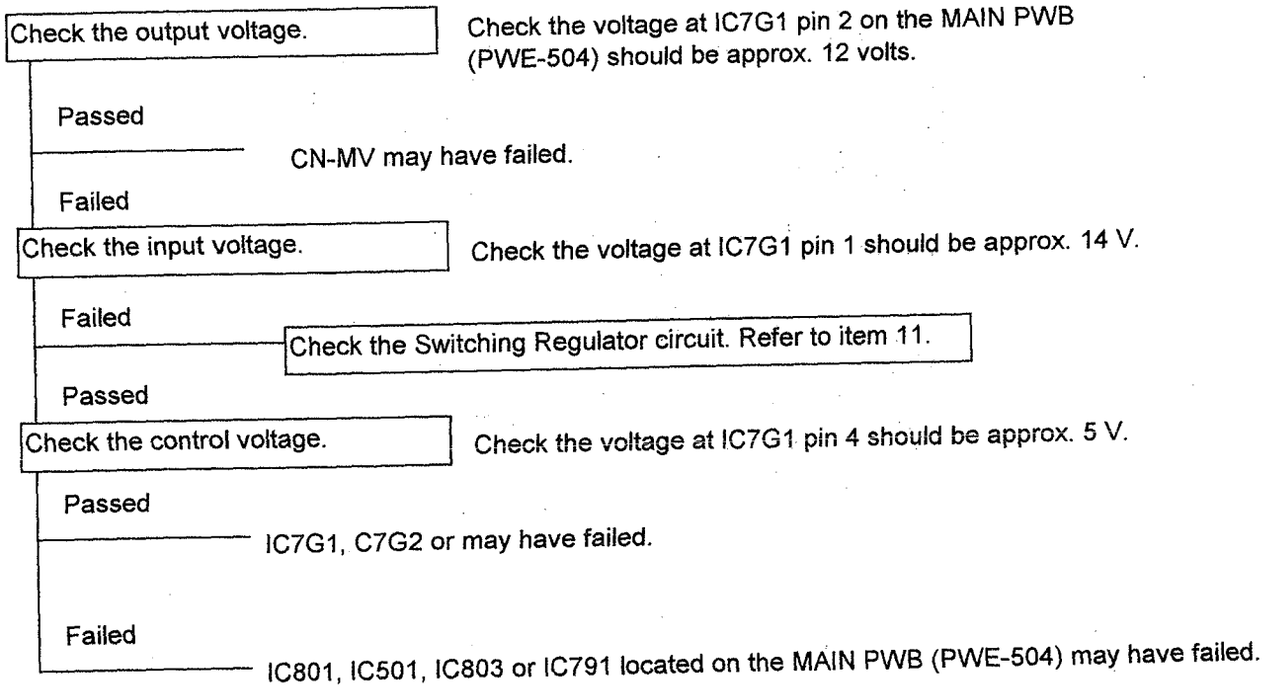
R508, R509 , IC501 or IC532 on the MAIN PWB(PWE-504) may have failed.

19. REGULATOR CIRCUIT FAILURE

19-1. 5V REGULATOR CIRCUIT FAILURE

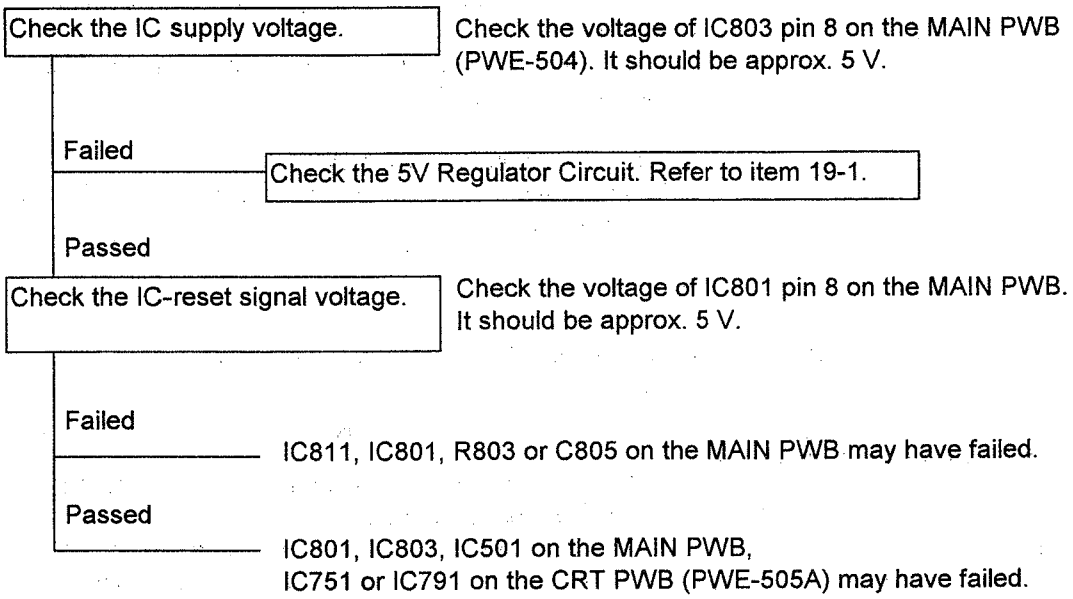

Check the power supply voltage.
Check the voltage of IC811 pin 1 on the MAIN PWB (PWE-504). It should be approx. 8V.
Failed
Check the Switching Regulator circuit. Refer to item 11. Or IC811, C811 or ZD7F1 may have failed.
Passed
IC811, IC801 or C812 may have failed.

19-2. 12V REGULATOR (VIDEO) CIRCUIT FAILURE

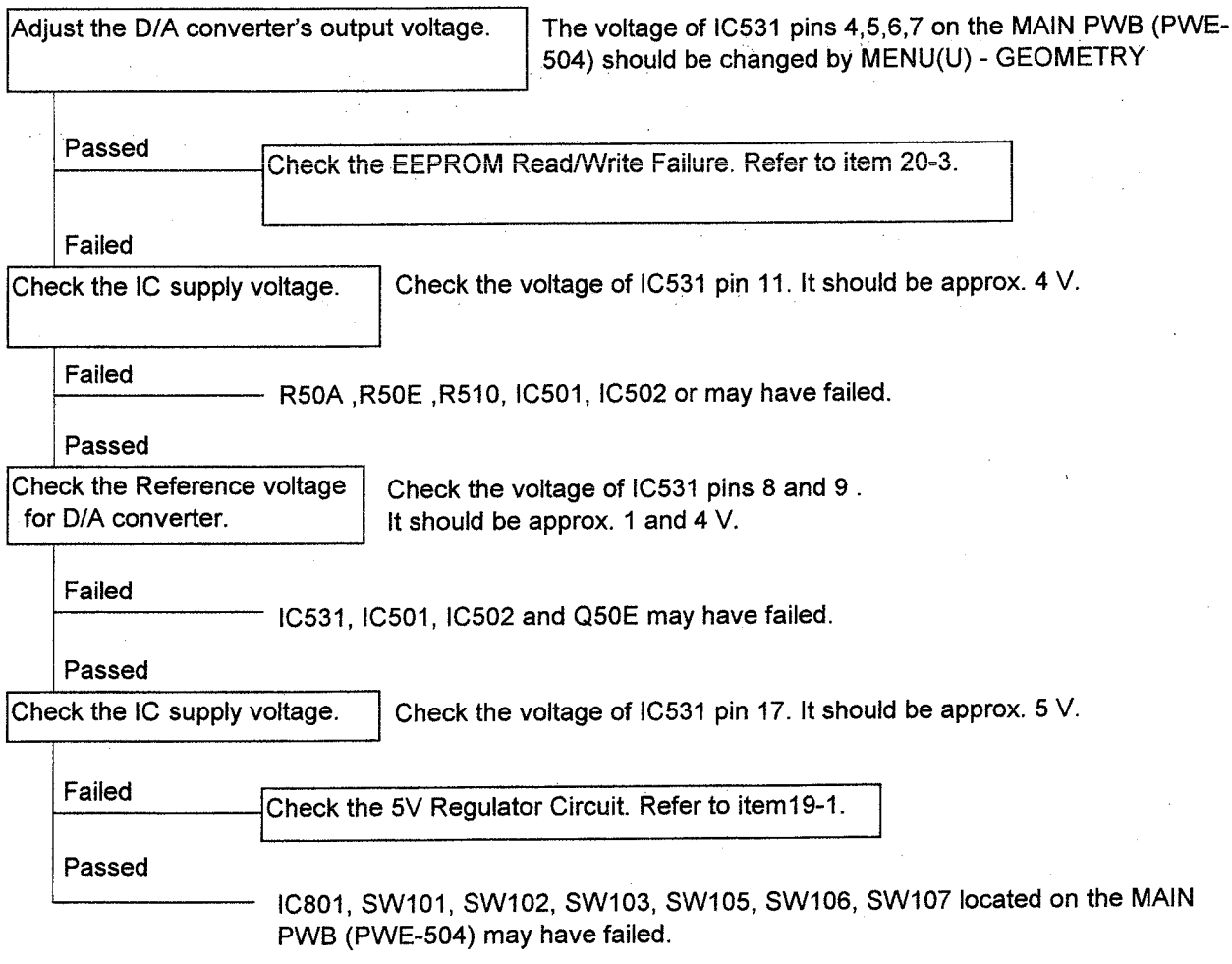

Check the output voltage.
Check the voltage at IC7G1 pin 2 on the MAIN PWB (PWE-504) should be approx. 12 volts.
Passed
CN-MV may have failed.
Failed
Check the input voltage.
Check the voltage at IC7G1 pin 1 should be approx. 14 V.
Failed
Check the Switching Regulator circuit. Refer to item 11.
Passed
Check the control voltage.
Check the voltage at IC7G1 pin 4 should be approx. 5 V.
Passed
IC7G1, C7G2 or may have failed.
Failed
IC801, IC501, IC803 or IC791 located on the MAIN PWB (PWE-504) may have failed.

20. DC CONTROL CIRCUIT FAILURE

20-1. I^2C DATA FAILURE


Check the IC supply voltage.
Check the voltage of IC803 pin 8 on the MAIN PWB (PWE-504). It should be approx. 5 V.
Failed
Check the 5V Regulator Circuit. Refer to item 19-1.
Passed
Check the IC-reset signal voltage.
Check the voltage of IC801 pin 8 on the MAIN PWB. It should be approx. 5 V.
Failed
IC811, IC801, R803 or C805 on the MAIN PWB may have failed.
Passed
IC801, IC803, IC501 on the MAIN PWB,
IC751 or IC791 on the CRT PWB (PWE-505A) may have failed.

20-2. DAC OUTPUT VOLTAGE FAILURE


Adjust the D/A converter's output voltage.
The voltage of IC531 pins 4,5,6,7 on the MAIN PWB (PWE-504) should be changed by MENU(U) - GEOMETRY
Passed
Check the EEPROM Read/Write Failure. Refer to item 20-3.
Failed
Check the IC supply voltage.
Check the voltage of IC531 pin 11. It should be approx. 4 V.
Failed
R50A ,R50E ,R510, IC501, IC502 or may have failed.
Passed
Check the Reference voltage for D/A converter.
Check the voltage of IC531 pins 8 and 9 . It should be approx. 1 and 4 V.
Failed
IC531, IC501, IC502 and Q50E may have failed.
Passed
Check the IC supply voltage.
Check the voltage of IC531 pin 17. It should be approx. 5 V.
Failed
Check the 5V Regulator Circuit. Refer to item19-1.
Passed
IC801, SW101, SW102, SW103, SW105, SW106, SW107 located on the MAIN PWB (PWE-504) may have failed.

20-2. EEPROM READ / WRITE FAILURE

Change functions at all signals on MENU(s).

1. Change the size, the position and the distortion at signal of VGA480 on MENU(S). Turn off OSM menu.

CAUTION:
Supposing the signal timing that has a trouble is known, use the same signa
l.

2. Turn off and on the power SW.
3. Make certain that the image position, size and distortion are correct.

Failed

IC801 or IC803 on the MAIN PWB (PWE-504) may have failed.

Passed

Change some functions at some signals on MENU(u).

4. Change the size, position and distortion on MENU(U), and turn off OSM menu.
5. After a few seconds, turn off and on the power SW. Make certain that the image position, size and distortion are same as condition 4.

Failed

IC801 or IC803 on the MAIN PWB may have failed.

Passed

Make certain reset function works by "ALL RESET" .

6. Push "RESET" SW , when MENU(U) - TOOL - "ALL RESET" is highlighted .
7. Make certain that the image position, size and distortion are same as condition 3.

Failed

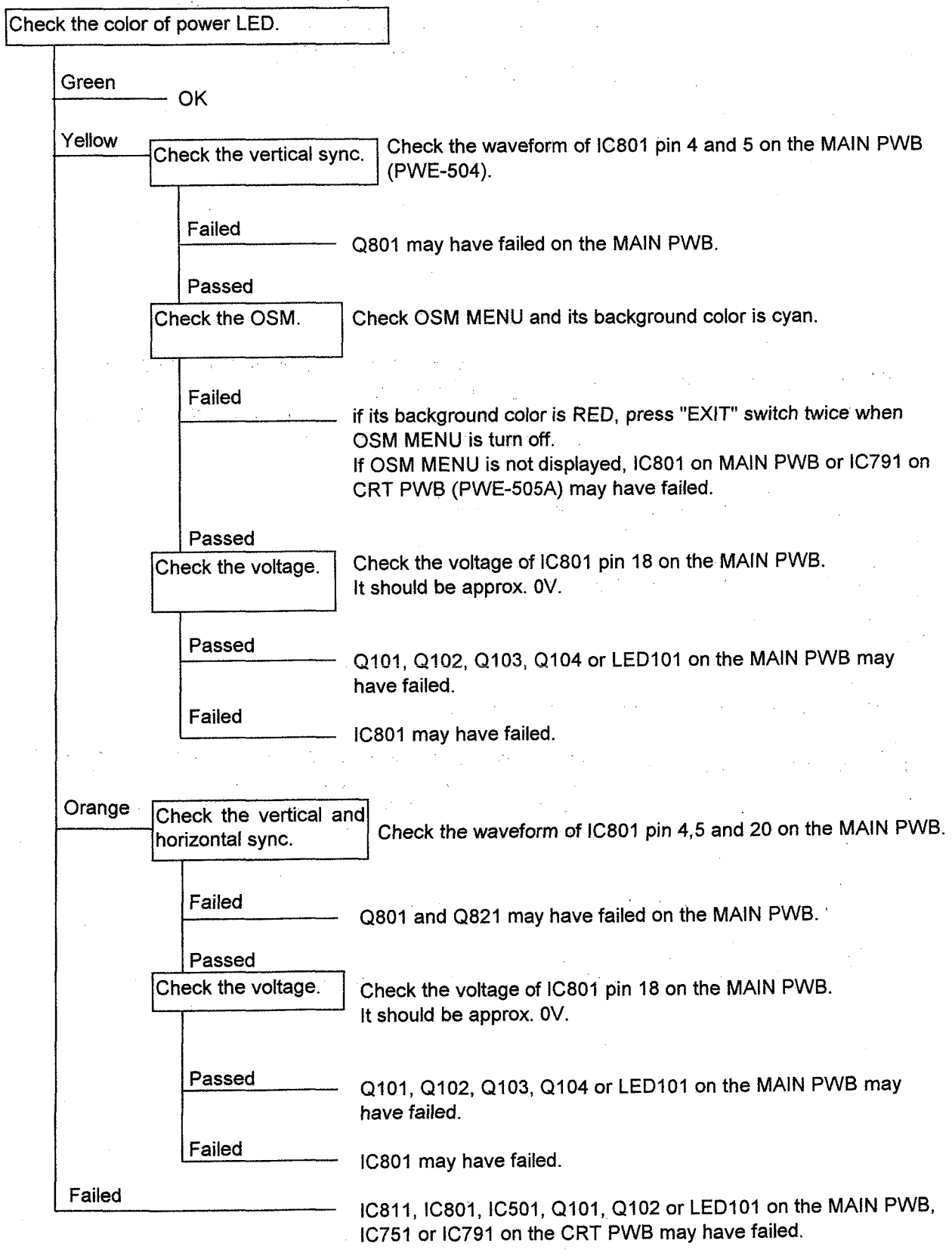
IC801, IC803 or SW106 may have failed.

Passed

OK. Readjust the changed value of signal.

21. PMS(Power Management System) INCORRECT OPERATION OR FAILURE

21-1. PMS FAILURE 1 (When a monitor receives Horizontal and Vertical Sync.)


Check the color of power LED.
Green
OK
Yellow
Check the vertical sync.
Check the waveform of IC801 pin 4 and 5 on the MAIN PWB (PWE-504).
Failed
Q801 may have failed on the MAIN PWB.
Passed
Check the OSM.
Check OSM MENU and its background color is cyan.
Failed
if its background color is RED, press "EXIT" switch twice when OSM MENU is turn off.
If OSM MENU is not displayed, IC801 on MAIN PWB or IC791 on CRT PWB (PWE-505A) may have failed.
Passed
Check the voltage.
Check the voltage of IC801 pin 18 on the MAIN PWB.
It should be approx. 0V.
Passed
Q101, Q102, Q103, Q104 or LED101 on the MAIN PWB may have failed.
Failed
IC801 may have failed.
Orange
Check the vertical and horizontal sync.
Check the waveform of IC801 pin 4,5 and 20 on the MAIN PWB.
Failed
Q801 and Q821 may have failed on the MAIN PWB.
Passed
Check the voltage.
Check the voltage of IC801 pin 18 on the MAIN PWB.
It should be approx. 0V.
Passed
Q101, Q102, Q103, Q104 or LED101 on the MAIN PWB may have failed.
Failed
IC801 may have failed.
Failed
IC811, IC801, IC501, Q101, Q102 or LED101 on the MAIN PWB, IC751 or IC791 on the CRT PWB may have failed.

21-2. PMS FAILURE 2 (When a monitor receives no Horizontal Sync)

Check the PMS control voltage.

Check the voltage of IC801 pin 29 on the MAIN PWB (PWE-504).
This voltage should be approx. 5V.
Check the voltage of IC801 pin 30 on the MAIN PWB
This voltage should be approx. 0V.

Failed — IC801 on the MAIN PWB may have failed.

Passed — OK

21-3. PMS FAILURE 3 (When a monitor receives no Vertical Sync)

Check the PMS control voltage.

Check the voltage of IC801 pin 29 on the MAIN PWB (PWE-504).
This voltage should be approx. 0V.
Check the voltage of IC801 pin 30 on the MAIN PWB
This voltage should be approx. 0V.

Failed — IC801 on the MAIN PWB may have failed.

Passed — IC7G1 on the MAIN PWB may have failed.

21-4. PMS FAILURE 4 (When a monitor receives neither Horizontal nor Vertical Sync.)

Check the PMS control voltage.

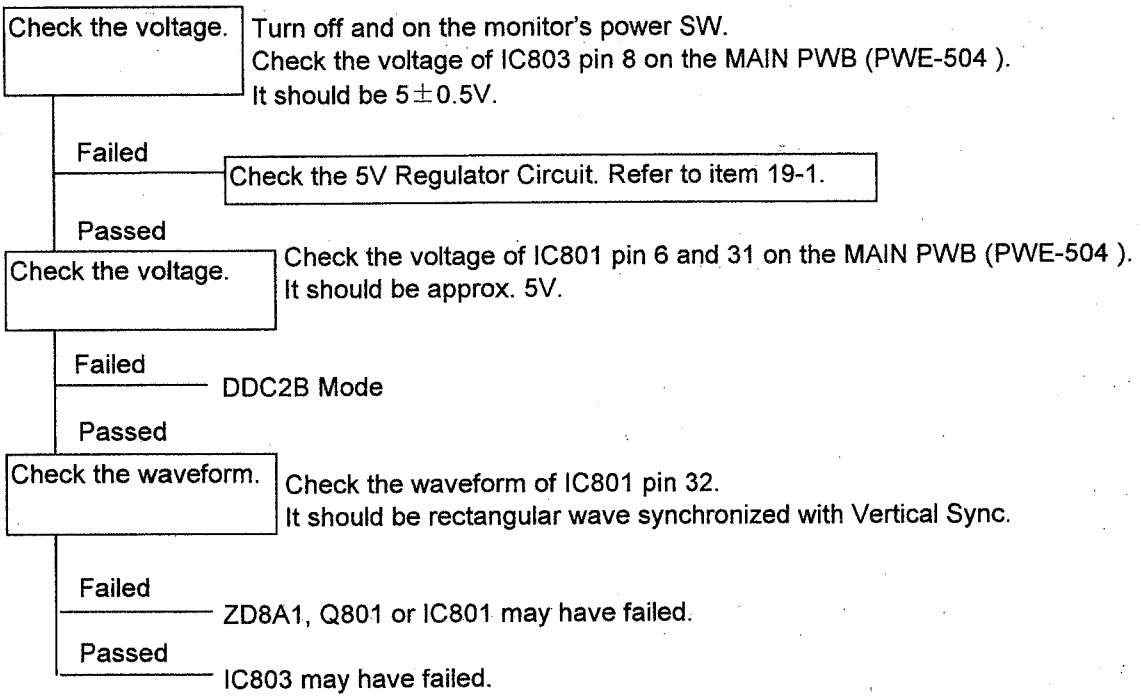
Check the voltage of IC801 pin 29 on the MAIN PWB (PWE-504).
This voltage should be approx. 0 V.
Check the voltage of IC801 pin 30 on the MAIN PWB.
This voltage should be approx. 5 V.

Failed — IC801 on the MAIN PWB may have failed.

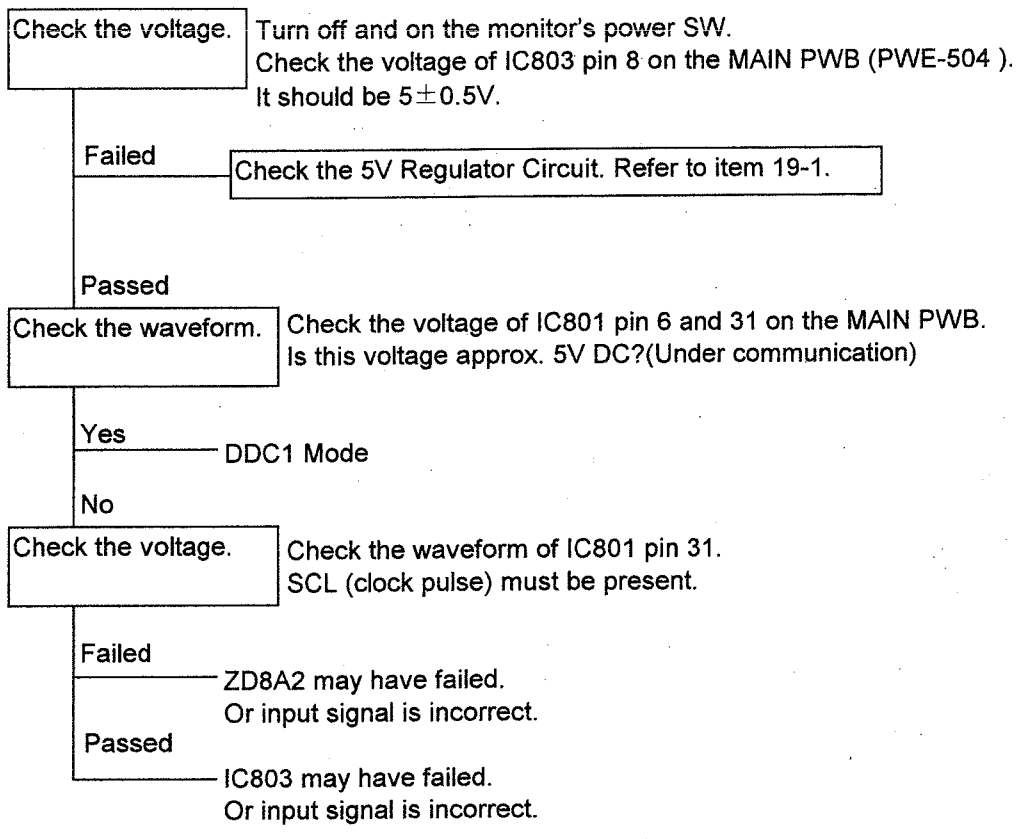
Passed — IC7G1,PC601 or Q7F1 on the MAIN PWB may have failed.

22. PLUG AND PLAY FUNCTION FAILURE

22-1. NO DDC1 DATA OUTPUT


Check the voltage.
Turn off and on the monitor's power SW.
Check the voltage of IC803 pin 8 on the MAIN PWB (PWE-504).
It should be 5±0.5V.
Failed
Check the 5V Regulator Circuit. Refer to item 19-1.
Passed
Check the voltage.
Check the voltage of IC801 pin 6 and 31 on the MAIN PWB (PWE-504).
It should be approx. 5V.
Failed
DDC2B Mode
Passed
Check the waveform.
Check the waveform of IC801 pin 32.
It should be rectangular wave synchronized with Vertical Sync.
Failed
ZD8A1, Q801 or IC801 may have failed.
Passed
IC803 may have failed.

22-2. NO DDC2B DATA OUTPUT


Check the voltage.
Turn off and on the monitor's power SW.
Check the voltage of IC803 pin 8 on the MAIN PWB (PWE-504).
It should be 5±0.5V.
Failed
Check the 5V Regulator Circuit. Refer to item 19-1.
Passed
Check the waveform.
Check the voltage of IC801 pin 6 and 31 on the MAIN PWB.
Is this voltage approx. 5V DC?(Under communication)
Yes
DDC1 Mode
No
Check the voltage.
Check the waveform of IC801 pin 31.
SCL (clock pulse) must be present.
Failed
ZD8A2 may have failed.
Or input signal is incorrect.
Passed
IC803 may have failed.
Or input signal is incorrect.

23. THE OSM FAILURE

CAUTION : If no picture when the video signal is input, refer to Item 2.

Check the OSM signals output. — Check the wave forms at IC791 pins 12, 13, 14, 15 when push the EXIT, CONTROL or PROCEED SW.

- Passed — IC711 may have failed.
- Failed

Check the H sync. input. — Check the wave forms at IC791 pin 5 on the VIDEO PWB(PWE-505A).

- Failed — Q791 or CN-B may have failed.
- Passed

Check the V sync. input. — Check the wave forms at IC791 pin 10 on the VIDEO PWB.

- Failed — IC791 may have failed.
- Passed

Check the OSM control line(I^2C). — Check the wave forms at IC791 pins 7 and 8 on the VIDEO PWB.

- Passed — IC711 may have failed.
- Failed

Check the user control line on the MAIN PWB. — User control key logic table for IC801 pins 18~24 is as below.

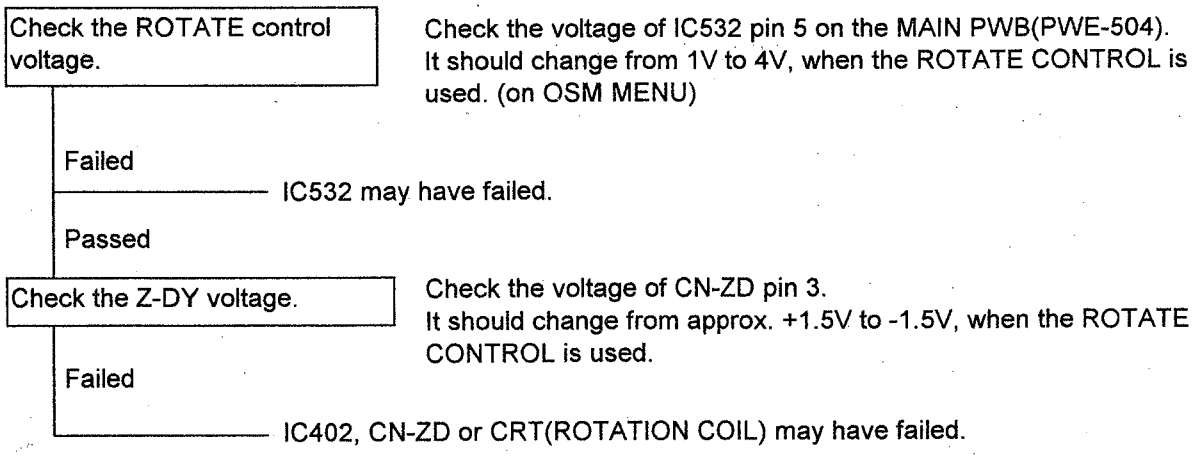
- Passed — IC801 or CN-M may have failed.
- Failed — SW101, 102, 103, 105, 106, 107 or IC801 may have failed.

PIN No.	58	59	60	61	62	63	64
EXIT	H	L	L	L	L	L	L
−	L	H	L	L	L	L	L
△	L	L	L	H	L	L	L
▽	L	L	H	L	L	L	L
+	L	L	L	L	H	L	L
PROCEED	L	L	L	L	L	H	L
RESET	L	L	L	L	L	L	H

"H" = "High" level 4.5~5.0V

"L" = "Low" level approximately 0V

24. ROTATION CORRECTION CIRCUIT FAILURE


Check the ROTATE control voltage.
Check the voltage of IC532 pin 5 on the MAIN PWB(PWE-504).
It should change from 1V to 4V, when the ROTATE CONTROL is used. (on OSM MENU)
Failed
IC532 may have failed.
Passed
Check the Z-DY voltage.
Check the voltage of CN-ZD pin 3.
It should change from approx. +1.5V to -1.5V, when the ROTATE CONTROL is used.
Failed
IC402, CN-ZD or CRT(ROTATION COIL) may have failed.

CIRCUIT DESCRIPTION

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1. SWITCHING REGULATOR CIRCUIT

1-1. Rectifying and Smoothing Circuit

AC input is rectified by D601. Then, it is smoothed by C609.

The resulting DC voltage is supplied to the converter circuit.

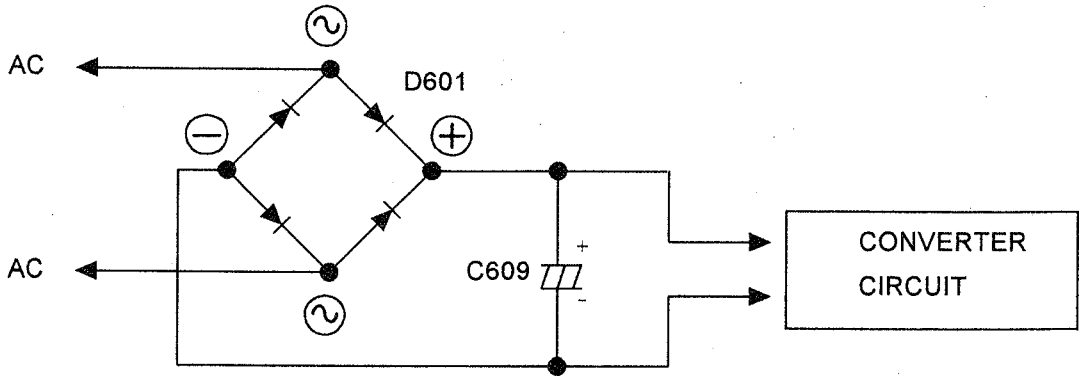


Fig.1-1 Rectifying and Smoothing Circuit

1-2. Auxiliary Power Supply Circuit

The auxiliary power supply circuit needs to activate IC621. When the power switch turns on, the charging current flows into the capacitor C627 and C612 through D621, D622 and R603. Oscillation starts when the voltage of IC621 pin 7 reaches 17V by this action.

After the start of oscillation, the fly-back voltage of the auxiliary winding of T601 is rectified and smoothed by D603, C612 and C627.

The resulting DC voltage is supplied to IC621 pin 7.

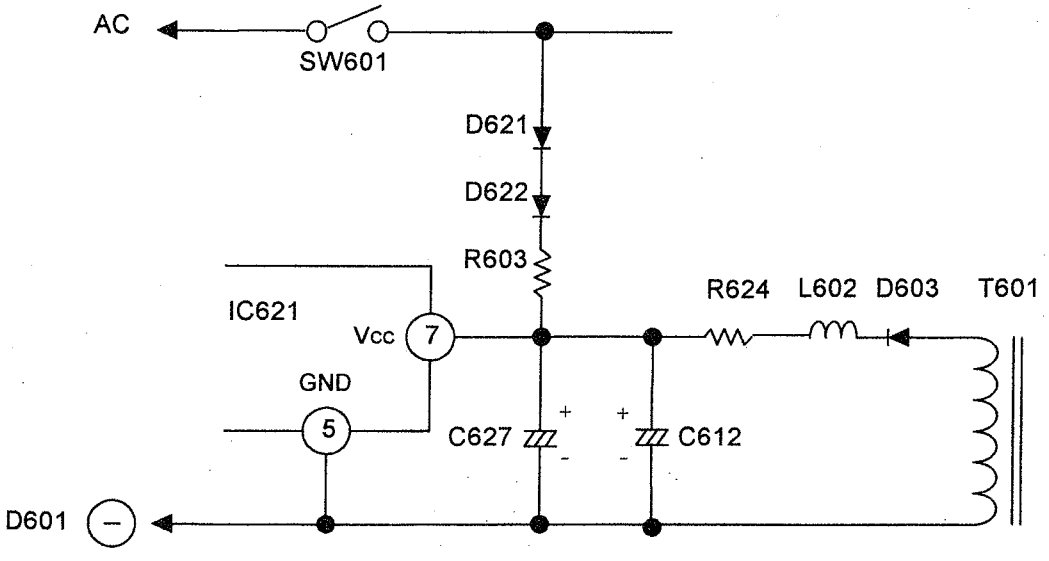


Fig.1-2 Auxiliary Power Supply Circuit

1-3. Converter Circuit

The converter circuit consists of the primary winding of T601, a switching device Q601 and surge absorbers (C610, C611, R605 and D602) which are connected to the primary winding of T601. The oscillating signal from IC621 pin 6 is applied to the gate of Q601 so that the drain-source is turned ON and OFF. In result, the oscillating voltage is applied to the primary winding of T601.

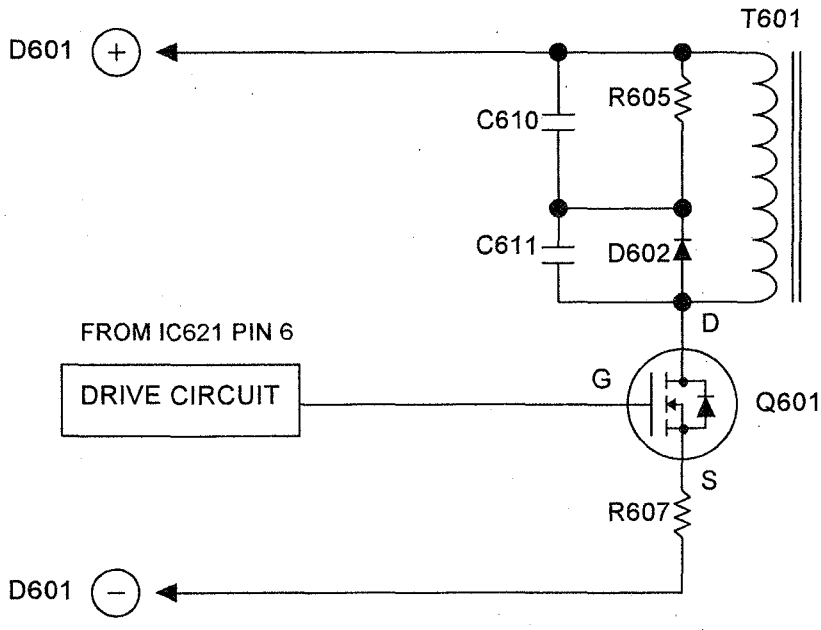


Fig.1-3 Converter Circuit

1-4. Output Rectifying and Smoothing Circuit

The fly-back voltages which are generated at the secondary windings of T601 are rectified by D651, D652, D653, D654, D655 and D656. Then, these voltages are smoothed by C653, C657, C660, C663 C665 and C667 so that DC voltages are obtained.

The DC voltages are maintained constantly by controlling the ON period duty cycle of Q601 in the converter circuit.

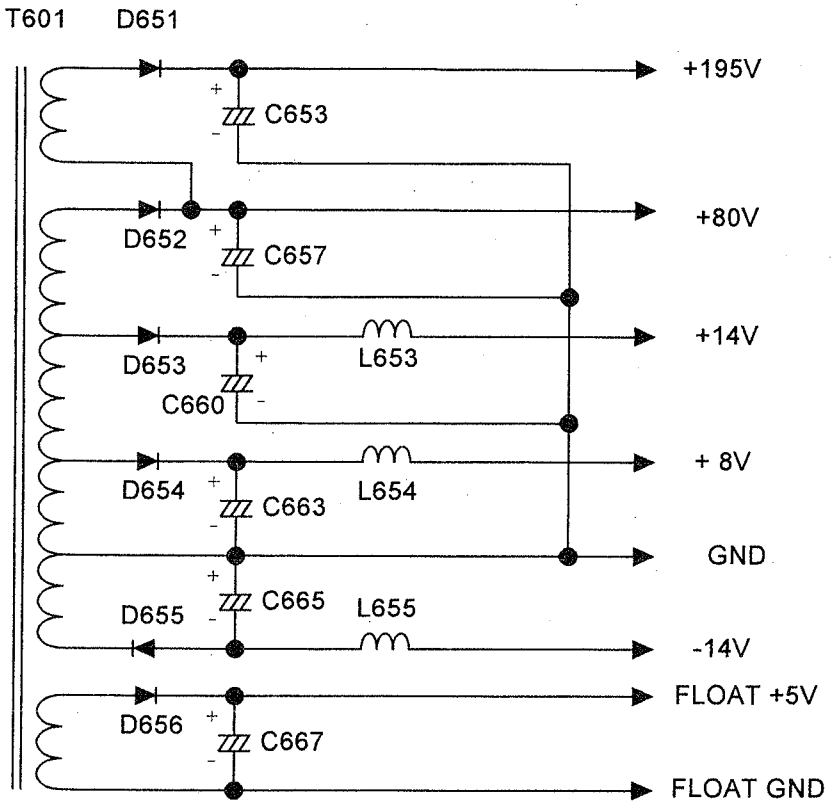


Fig.1-4 Output Rectifying and smoothing Circuit

1-5. Error Detection Amplifier Circuit

The output voltage 80V is compared with the reference voltage at the error amplifier IC671.
An error signal is applied to the control circuit via the photocupler PC603.

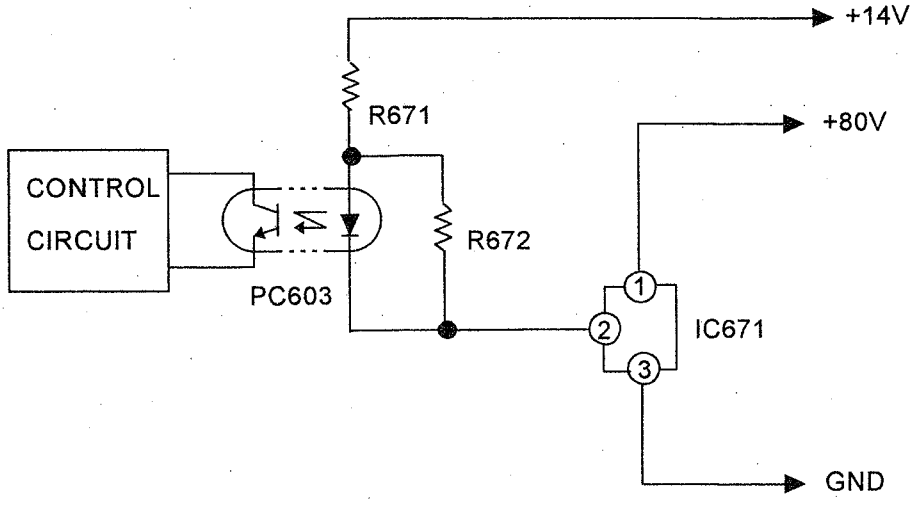


Fig.1-5 Error Detection Amplifier Circuit

1-6. Overvoltage Protection

If some failure occurs and the output voltage of secondary windings of T601 increase, the voltage of the auxiliary winding of T601 also increases proportionally. When the voltage of C612 increases beyond the zener voltage of ZD628, Q631 and Q633 turn on.
This action decreases the voltage of IC621 pin 1 and stops the oscillator within this IC.

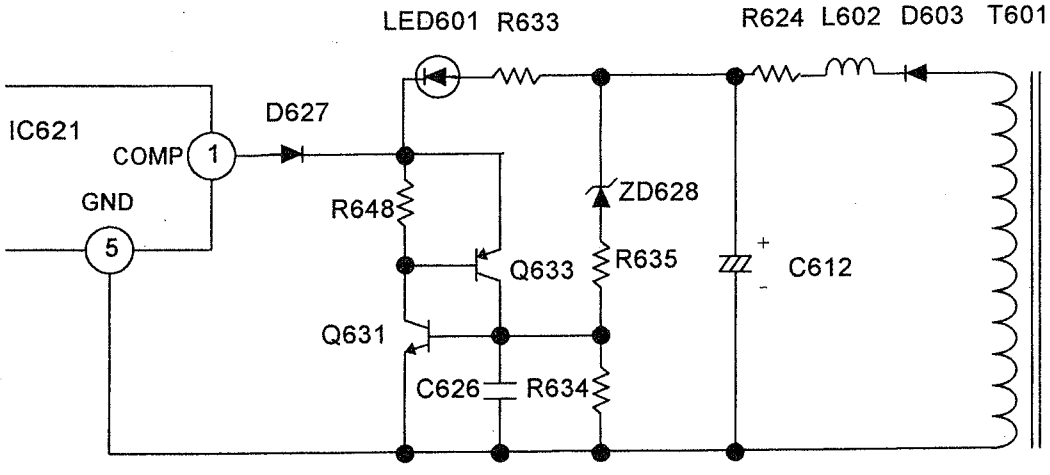


Fig.1-6 Overvoltage Protection

1-7. Oscillating and Control Circuit

The oscillating and control circuits are contained in IC621.

IC621 has a built-in oscillator that frequency is determined by R640 and C630 which are connected to pin 4 and pin 8 respectively. And when the pulse of horizontal sync. Signal is applied to R620, the switching frequency is synchronized with the horizontal frequency. The output of error detection amplifier circuit is fed back to IC621 pin 2 via PC603 to control the duty cycle of Q601. In result, the output voltage is kept constant.

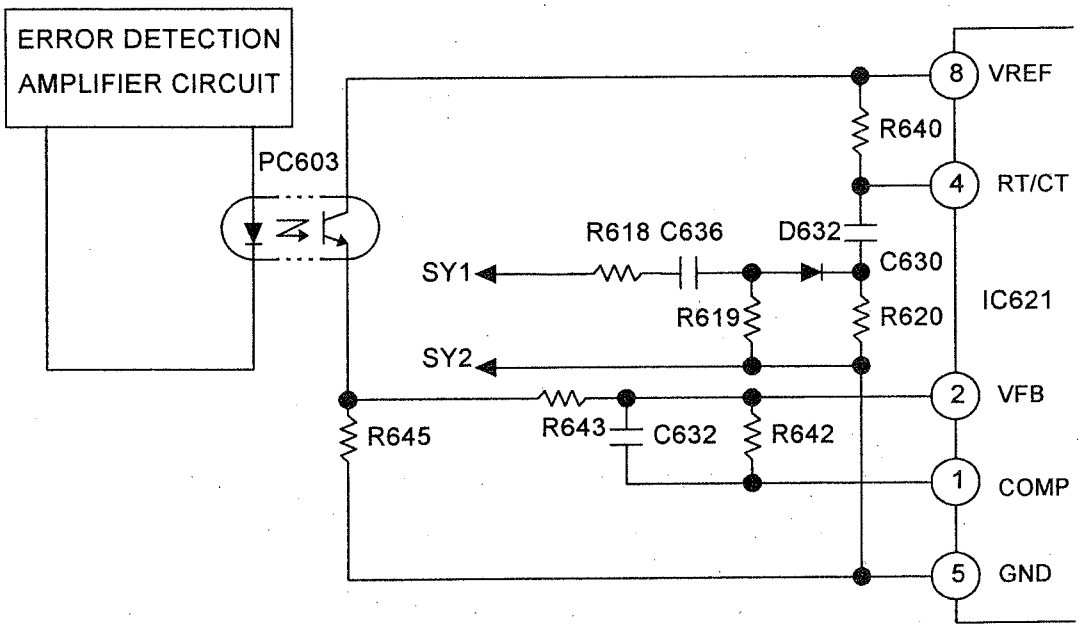


Fig.1-7 Oscillating and Control Circuit

1-8. Over Current Protection

If some failure occurs and the total power of secondary outputs increase, the peak voltage of IC621 pin 3 increases proportionally. And when the peak voltage of IC621 pin 3 reaches 1V, IC621 decreases ON period duty cycle of Q601. The voltage of secondary outputs and the voltage of auxiliary winding of T601 decrease.

When the auxiliary winding of T601 decreases below 8V, IC621 stops the oscillator within this IC. But the charging current flows into the capacitor C627 through R603 and the oscillation starts when the voltage of IC621 pin 7 reaches 17V by this action.

IC621 repeats the intermittent oscillation.

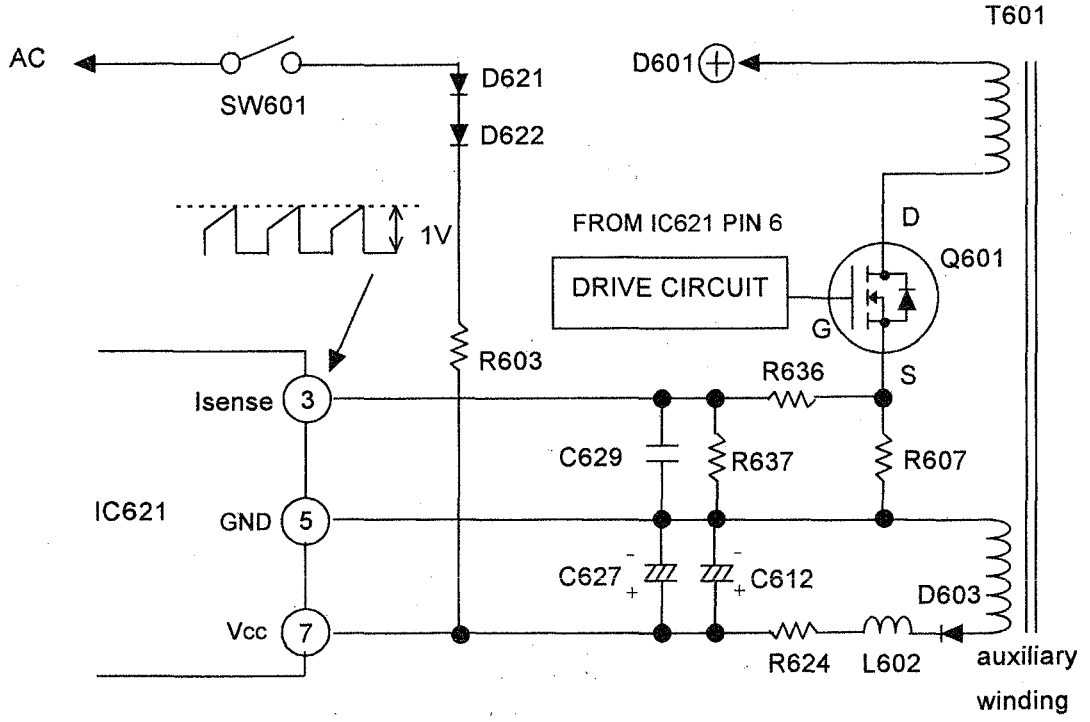


Fig.1-8 Over Current Protection

1-9. Power Management System Circuit

When the horizontal and vertical Sync. are missing, the voltage of IC801 pin 30 becomes high level and PC601, Q627 and Q628 turn on. Then the voltage of IC621 pin 1 becomes low level and IC621 stops the oscillator within this IC. LED601 lights orange by this action.

This is an "OFF STATE" condition.

When the horizontal Sync. is applied, this Sync. charges capacitor C872 and C873.

When Q871 and Q873 turn on, this charged energy is discharged. Then PC602 and Q630 turn on and LED601, Q627 and Q628 turn off. The charging current flows into the capacitor C627 through R603 again and the oscillation starts when the voltage of IC621 pin 7 reaches 17V.

It becomes an "ON STATE" condition.

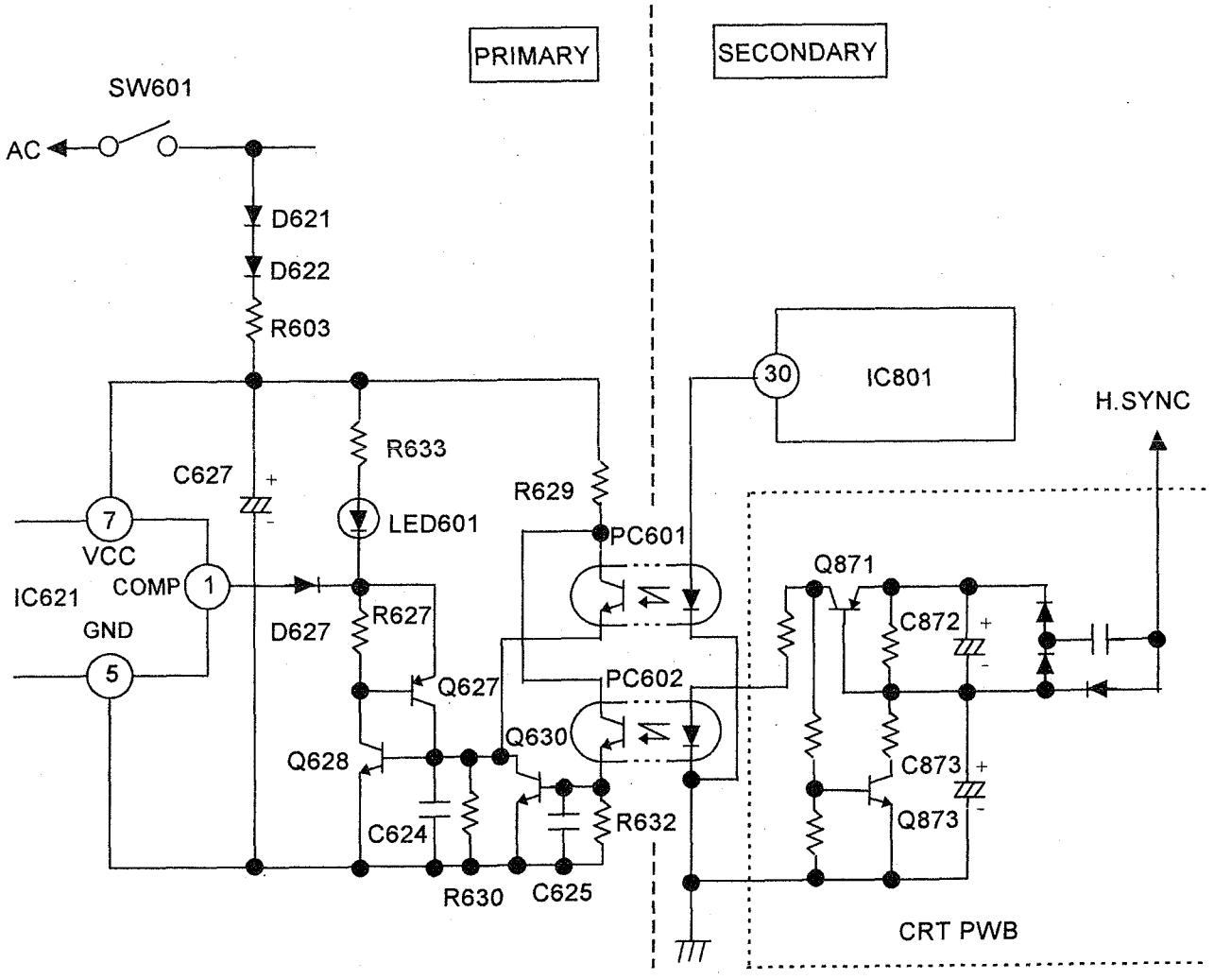


Fig.1-9 Power Management System Circuit

1-10. Degaussing Circuit

When the power switch turns on, or when user accesses the OSM degauss control, the current flows from IC801 pin 57 to the base of Q671 through R677. Then Q671 and RL601 turn on for approximately two seconds.

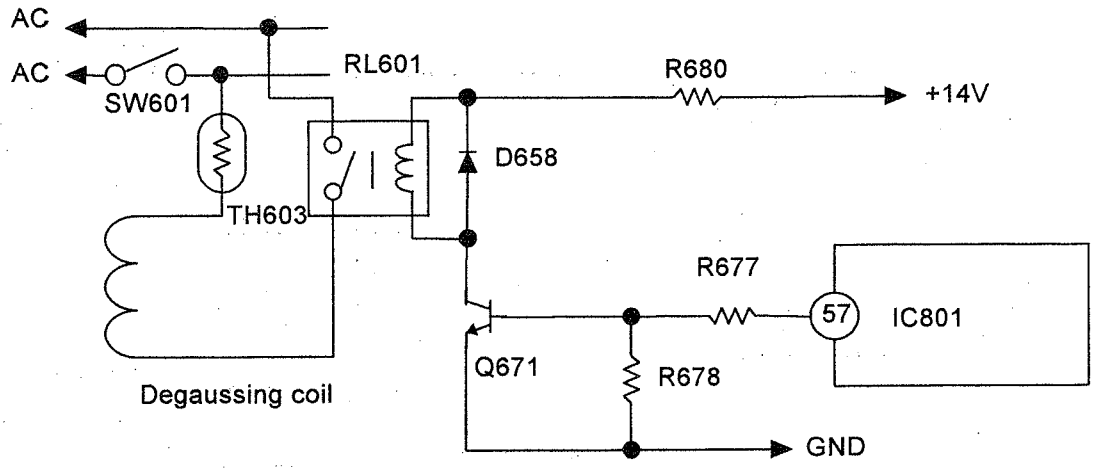


Fig.1-10 Degaussing Circuit

2. CPU CIRCUIT

2-1. Digital Control

2-1-1. Composition

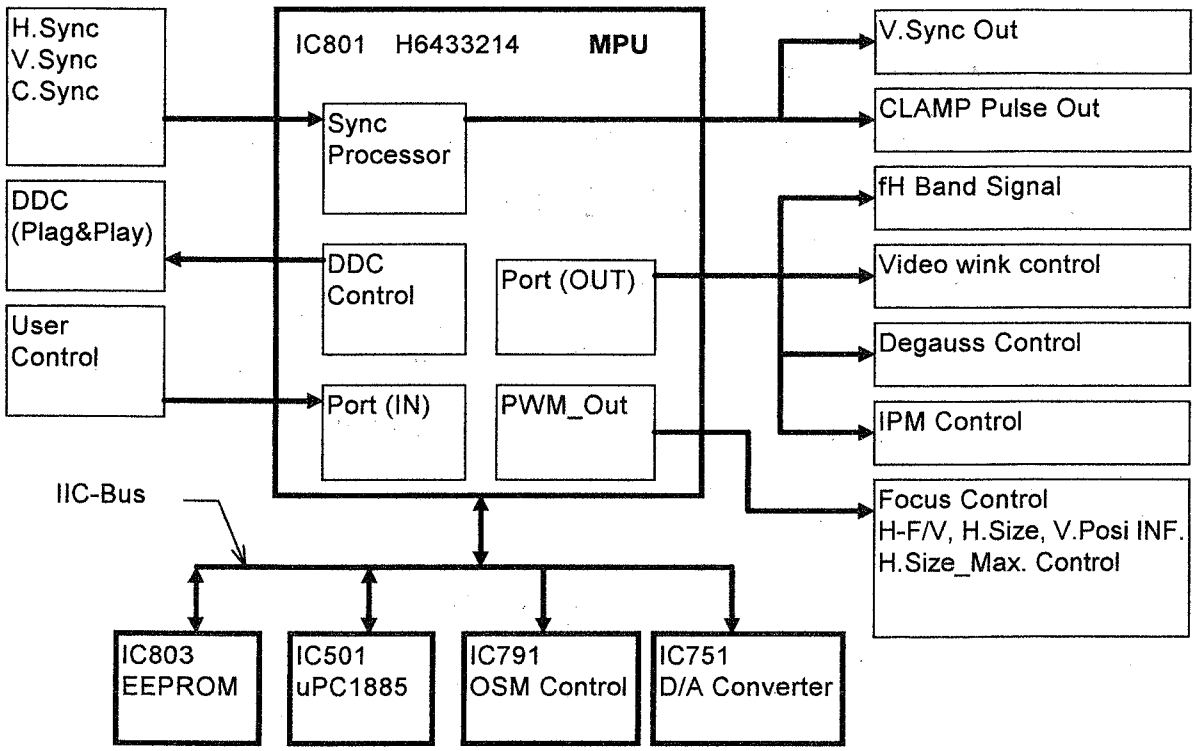


Fig.2-1-1

The digital control section is designed around a MPU.

This section consists of follows section.

User control		7 switches.
EEPROM:	(Memory)	stores dates of image position, size, distortion etc..
uPC1885		OSC. & Distortion control IC
D/A converter	8bit/8ch	controls video circuit.
OSM	OSD	OSD information is built in.
MPU	8bit 1chip microcomputer	16MHz operation.
		include Sync. Processor & DDC function.

Notes: IPM = Intelligent Power Manager

OSM = On Screen Manager

2-2. Function

Main functions of this section are as follows,

1) Interface circuit

Input:	Separate Sync.
	Composite Sync.
	Separated Composite Sync. from Sync On Green.
	(JC-1575VMB, JC-1746UMB only)
Output:	Negative V.Sync. (supply to OSD IC)
	Clamp pulse. (supply to video pre-amp.)

2) Plug and Play (PnP) circuit

For Plug & Play

VESA DDC1 / 2B

3) Automatic signal discrimination.

Frequency Measuring

Automatic signal discrimination.

Video Blanking control (WINK).

IPM Control (Circuit & LED light color control.)

fH Band signal output

4) User Control based on OSM.

OSM display and user operation.

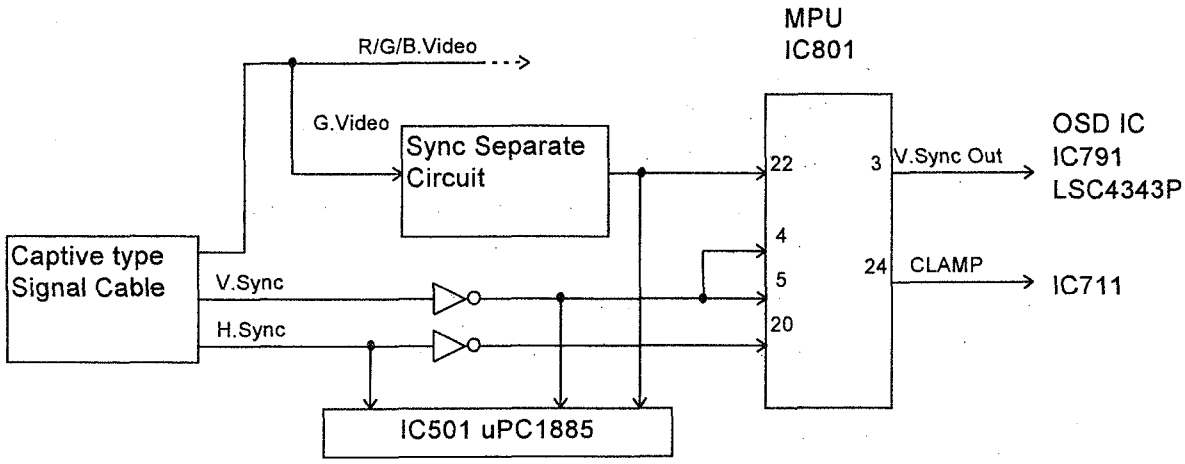
uPC1885 and D/A converter control.

5) Others

Degaussing control.

2-3. Interface Circuit

2-3-1. Composition



2-3-2. Input and Output for Sync Processor (in IC801)

Input

Pin No.	Signal	Sync. Polarity
4	Vertical Sync	Positive / Negative
20	Horizontal Sync Composite Sync	Positive / Negative
22	Sync On Green (Passed through Sync Separate Circuit)	Positive / Negative

Output

Pin No.	Signal	Sync. Polarity
3	Vertical Sync	Negative
24	Clamp Pulse	Positive

2-3-3. Sync Priority

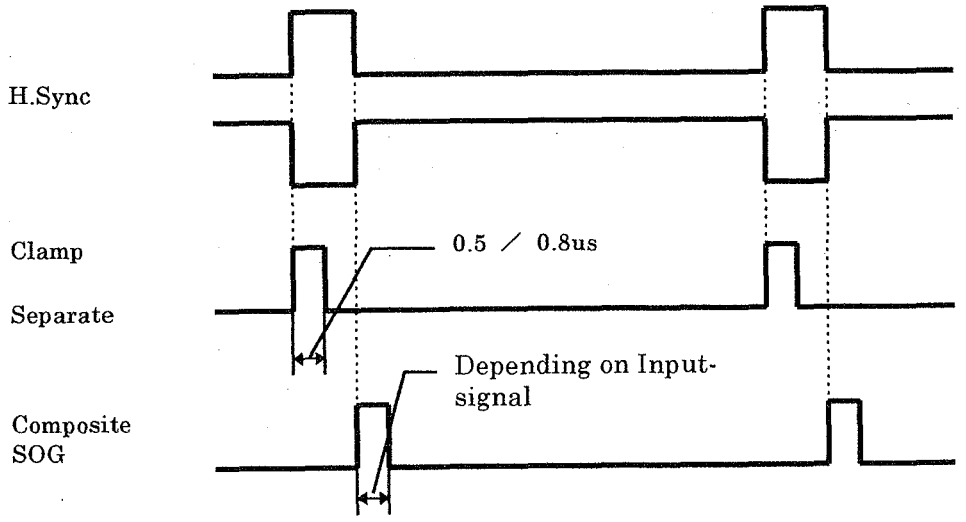
MPU(IC801) gets Input Signal in order of priority as follows.

1 : Separate Sync

2 : Composite Sync

3 : Sync On Green

2-3-4. Clamp Pulse Output Timing



(1) Separate Sync

MPU (IC801) outputs CLAMP PULSE (from 24 pin) that synchronizes front-edge of Horizontal Sync.

The CLAMP PULSE width is 0.5u sec or 0.8u sec .

(2) Composite Sync / Sync On Green

MPU(IC801) outputs CLAMP PULSE (from 24 pin) that synchronizes back-edge of Horizontal Sync.

The CLAMP PULSE width changes by signals.

(3) No Horizontal Sync

24 Pin of MPU(IC801) outputs "LOW" level.

2-3-5. VSYNCO Output

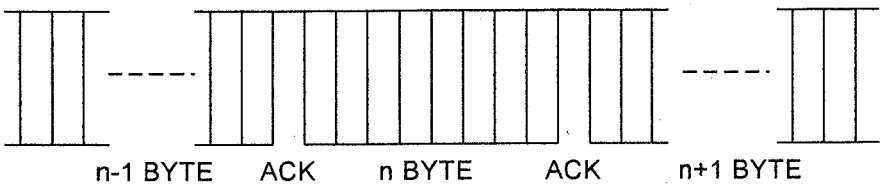
Polarity of VSYNCI (Pin 4) Polarity of Vertical element included HSYNCI CSYNCI	Polarity of VSYNCO (Pin 3)
Positive	Inverted (Negative)
Negative	Non-inverted (Negative)
None	Low

2-4. Plug and Play(PnP) Circuit

VESA Display Data Channel(DDC)

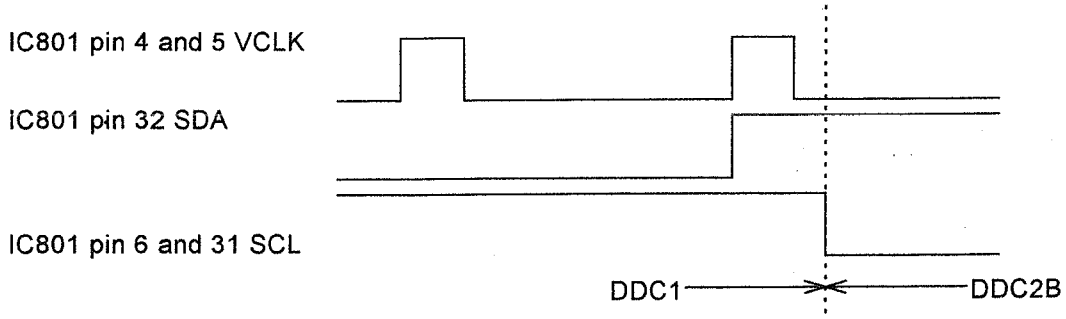
2-4-1. DDC1

When IC801 pin 5 receives vertical clock (VCLK), IC801 makes serial data (SDA) at pin 32 that is synchronized with VCLK rising. The contents of SDA is called EDID data, and the information of monitor's specifications and signal supports are stored. They are composed of 8 bit, 128 byte. The data of SDA are composed of 9 bit. The highest rank bit is ignored. (acknowledge). The output of pin 32 is always high level. In DDC1, EDID data is output continuously.



2-4-2. DDC2B

When serial clock (SCL) of IC801 pin 6 and pin 31 are changed from high level to low level, mode is changed to DDC2B. EDID data is same as DDC1, but output protocol is different. IC801 makes serial data (SDA) that is synchronized with SCL rising. DDC1 uses sequential access only, but DDC2B uses sequential and random access.



2-5. Signal Automatic Discrimination

2-5-1. Frequency Measuring

The sync pulse is supplied to IC801 pins 4, 20 and 22.

Type of signal	Pin No.
Separate	4 and 20
Composite	20
Sync on green	22

IC801 counts frequency of sync signal and sends frequency data block to IC501 based on I^2C protocol.

If frequency of sync signal is out of specification, IC801 discriminates as 50kHz.

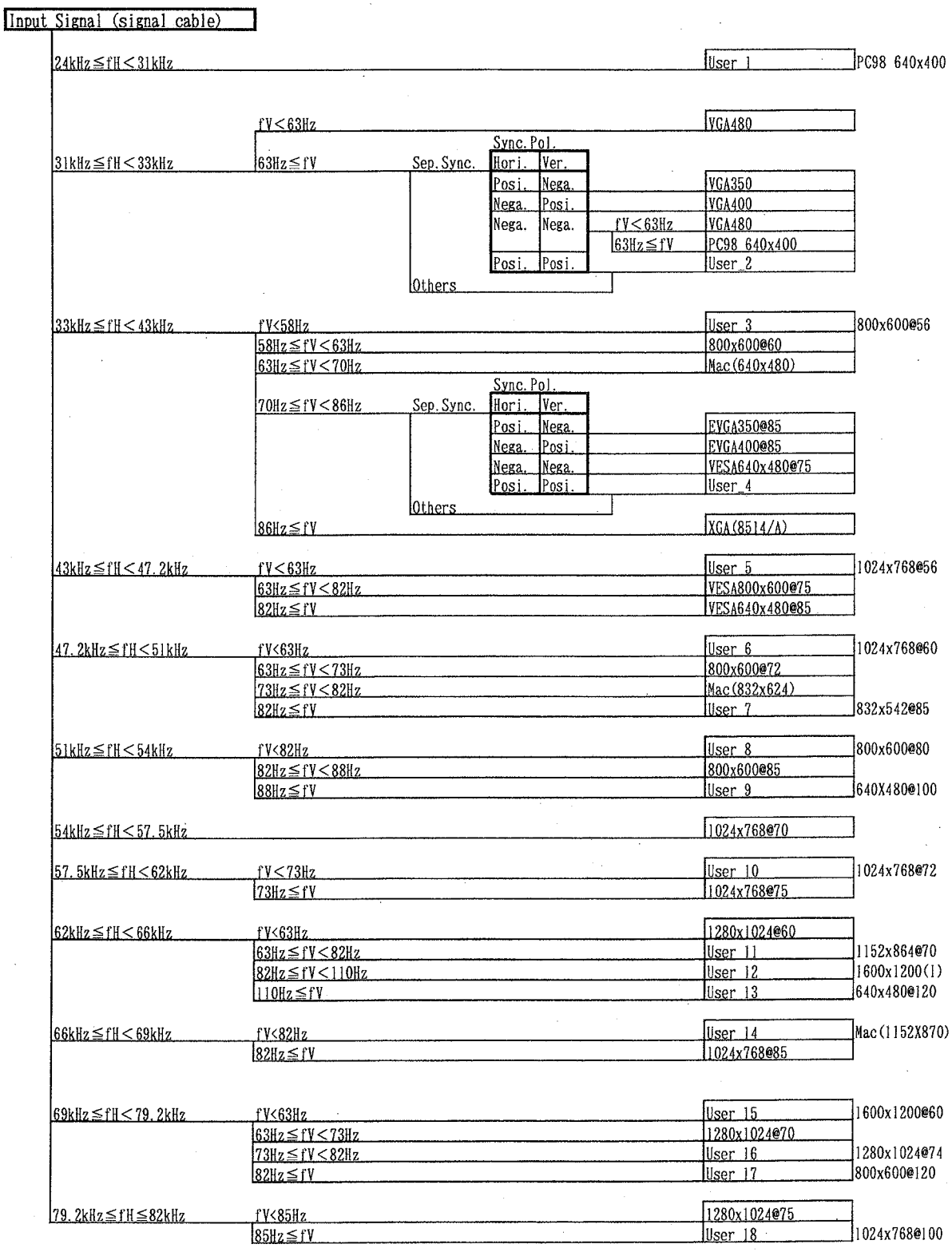
Sync range

Horizontal : 31kHz ~ 69kHz

Vertical : 55Hz ~ 120Hz

2-5-2. Automatic Signal Discrimination

(1) Signal Identification Flowchart



Note: "USER **" SIGNALS DON'T HAVE BACK-UP MEMORIES

(2) Video Blanking control (WINK)

In order not to display an out-of-sync video image, logic of IC801 pin 1 becomes high temporarily. This voltage is supplied to IC711 pin 20 to turn off video image.

This function operate in the following case.

1) When power is on
2) When the signal frequency (horizontal or vertical) has changed
3) When the type of signal has changed
4) When recovering from IPM
5) When the vertical sync frequency is more than 160Hz

Logic of pin 1	Video image
L	Normal screen image
H	Blanking is applied

(3) H. V. BLANK (E700 only)

In order to reduce load of horizontal deflection output circuit, high voltage is lowered temporarily.

This function operate in the following case.

1) When power is on
2) When the horizontal sync frequency has changed
3) While H-F/V is changing

Logic of pin 3	HV
L	Normal
H	Lowered

(4) Sync Type

When sync signals are separate or composite, video green signal is input to IC801 pin 22 instead of sync on green. As a result, noise ride on a video image.

To prevent noises, logic of pin 19 is high level when sync signals are separate or composite at on mode. Then Q511 turns on and prevent video green signal inputting to IC801 pin 22

H. Sync pin 20	Logic of pin 19
Existence	H
No-existence	L

2-5-3. IPM

These circuits reduce power consumption. They have 3 modes that are stand-by, suspend and off.

Component of H. Sync	Component of V. Sync	Mode	PMS ON pin 29	PMS OFF pin 30	LED
Existence	Existence	On	H	L	Green
No-existence	Existence	Stand-by	H	L	Green
Existence	No-existence	Suspend	L	L	Yellow
No-existence	No-existence	Off	L	H	Orange

2-5-4. fH BAND

To keep the horizontal linearity optimal, fH Band signals are output for control of the horizontal deflection output circuit.

Frequency(kHz)	fH BAND				
	pin 46	pin 45	pin 44	pin 43	pin 42
fH ≦ 30.0	H	H	L	L	H
30.0 < fH ≦ 34.0	L	L	L	H	H
34.0 < fH ≦ 36.5	L	H	L	H	H
36.5 < fH ≦ 40.0	L	H	H	H	H
40.0 < fH ≦ 44.0	H	L	L	H	H
44.0 < fH ≦ 47.5	H	L	H	H	H
47.5 < fH ≦ 51.0	H	H	L	L	H
51.0 < fH ≦ 55.0	H	H	L	H	H
55.0 < fH ≦ 59.0	H	H	H	L	H
59.0 < fH ≦ 62.0	H	H	H	L	H
62.0 < fH ≦ 67.0	H	H	H	L	H
67.0 < fH ≦ 69.0	H	H	H	H	H
69.0 < fH	H	H	L	L	H

2-6. User Control Operation

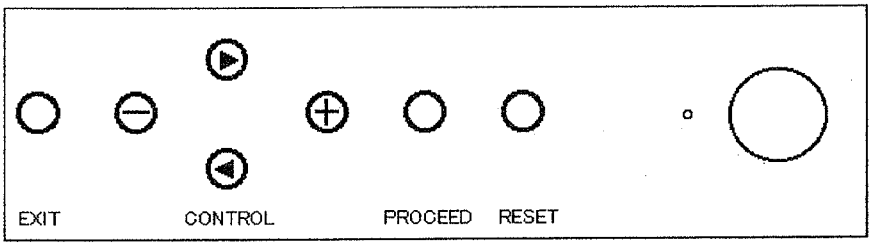
2-6-1. User Control Interface

Input(IC801)

Pushed SW	pin 58	pin 59	pin 60	pin 61	pin 62	pin 63	pin 64
EXIT	**H**	L	L	L	L	L	L
-	L	**H**	L	L	L	L	L
◀	L	L	**H**	L	L	L	L
▶	L	L	L	**H**	L	L	L
+	L	L	L	L	**H**	L	L
PROCEED	L	L	L	L	L	**H**	L
RESET	L	L	L	L	L	L	**H**

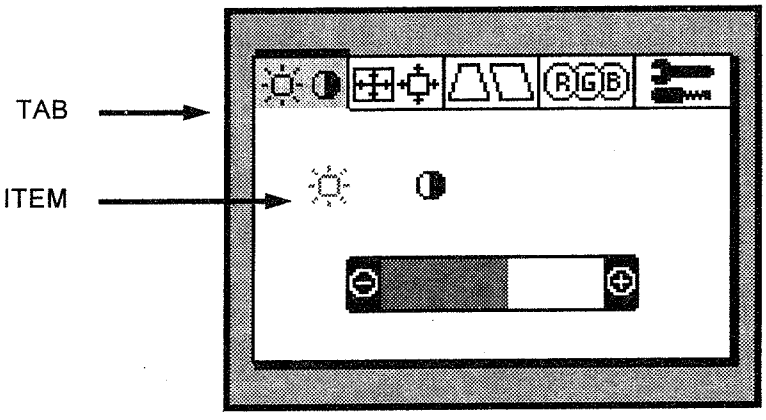
OSD

This model is adjusted through OSD(On Screen Display; it is called OSM^{TM} in USA), by operating Control Panel.



Control Panel

OSM MENU structure is as below.(it is structured "TAB", "ITEM")

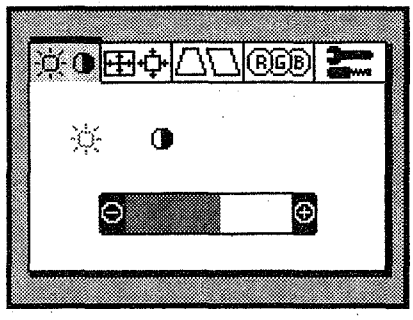


"TAB", "ITEM"

2-6-2. Control OSM MENU

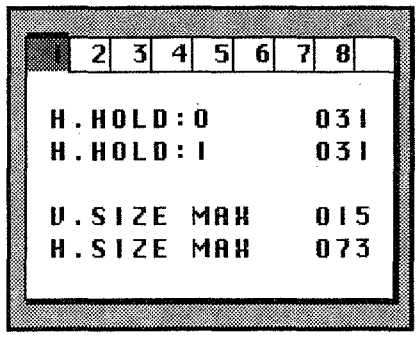
On Screen Display menu is divided into the 2 types.

(1) MENU(USER): Menu containing items that can be operated by user.



USER MENU

(2) MENU(SERVICE): Menu that is hidden from user.



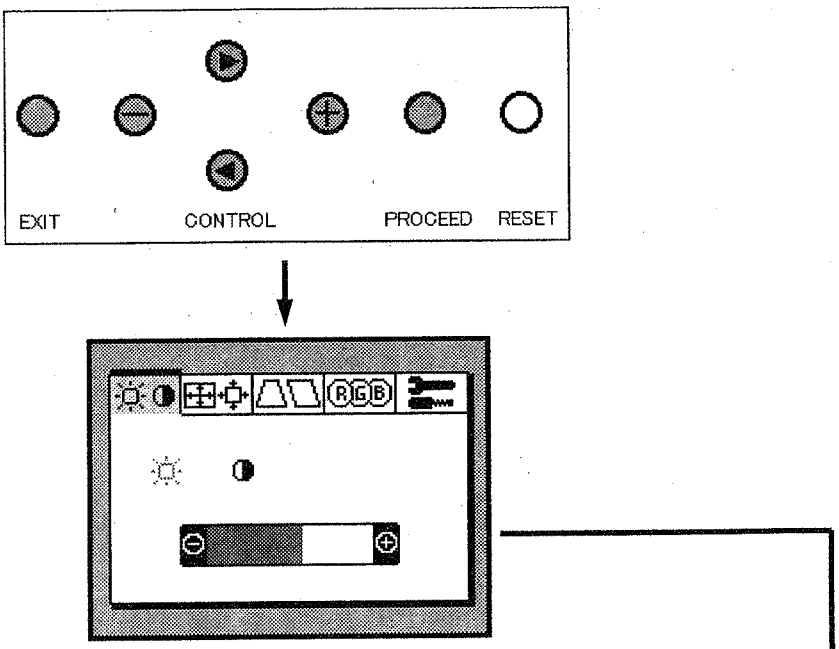
SERVICE MENU

Hereafter, they will be called **MENU(U)**, and **MENU(S)**.

The menu can be displayed when a signal is input to the Monitor.

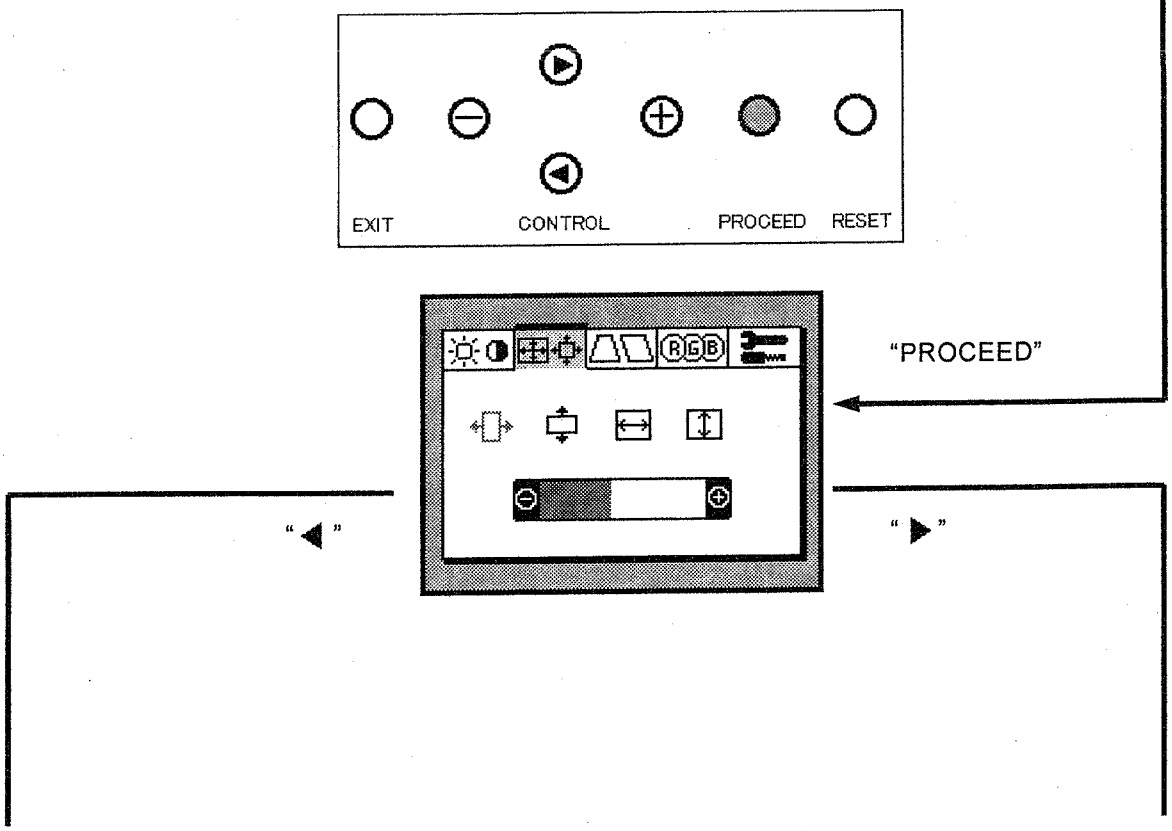
(3) How to display OSM MENU

MENU(U): Press "EXIT" or "-", "+", " ▶ ", " ◀ ", "PROCEED" once when OSM MENU is not displayed.



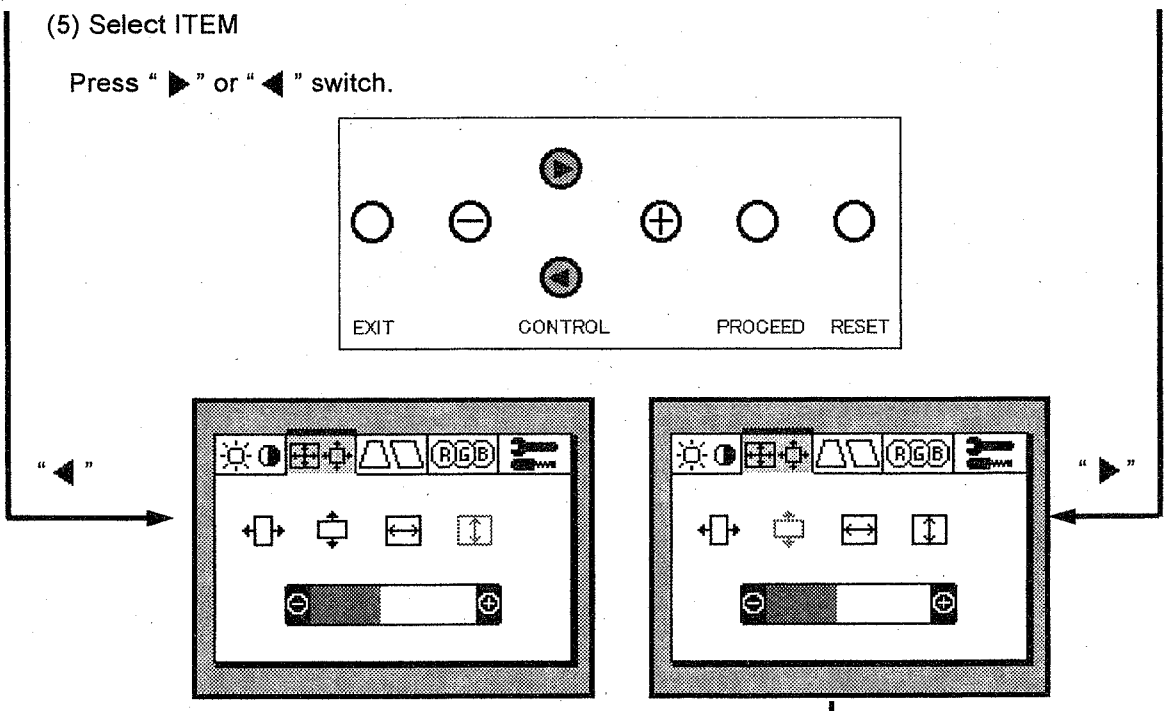
(4) How to change TAB

Press "PROCEED" switch.



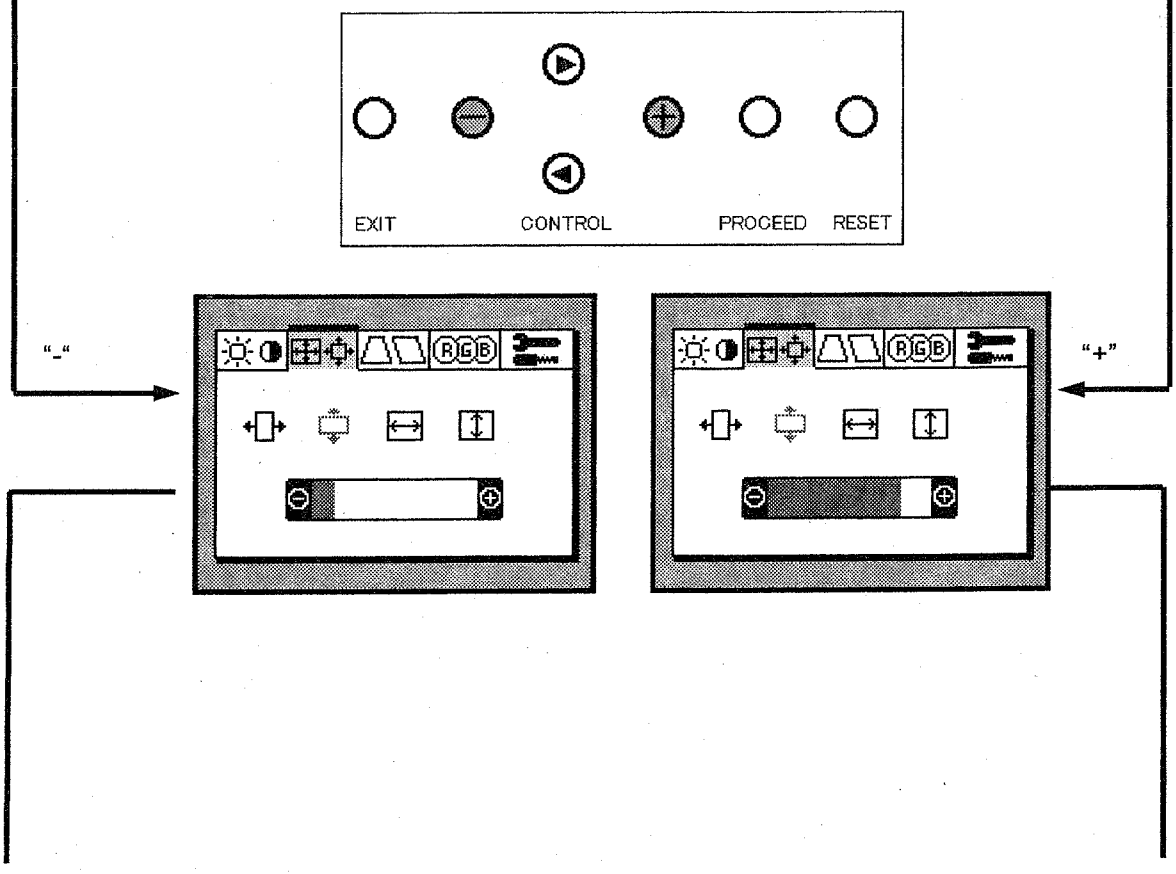
(5) Select ITEM

Press " ▶ " or " ◀ " switch.



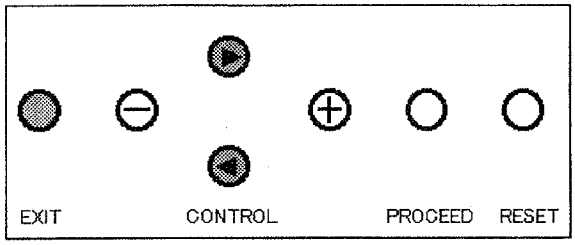
(6) Change data value

Press "-" or "+" switch.



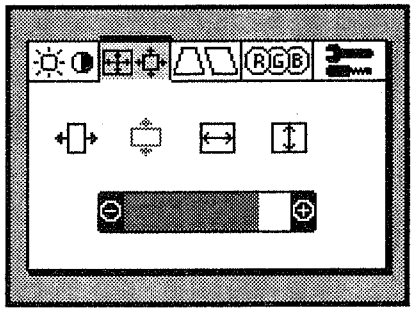
(7) Save DATA value to memory

Move highlighted TAB or ITEM to other place, or turn off OSM MENU.
(Press "EXIT" or " ▶ ", " ◀ " switch)



(8) Turn off OSM MENU

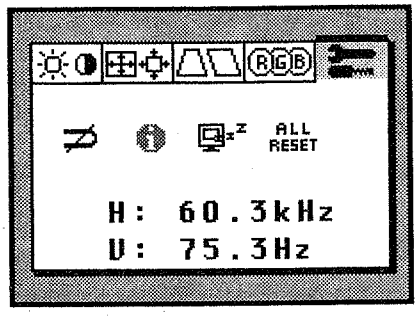
Press "EXIT" switch.



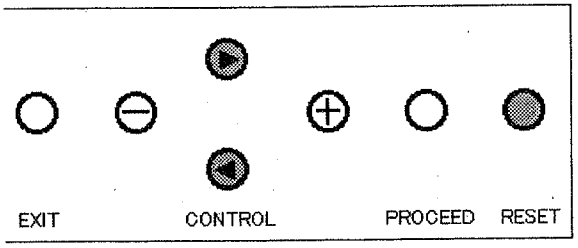
"EXIT" → Turn off OSM MENU

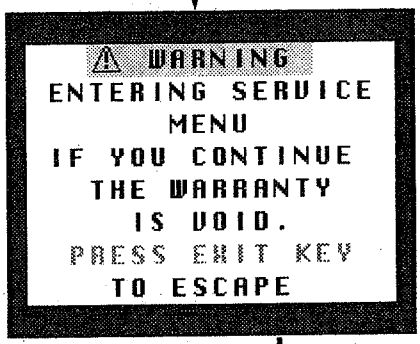
(9) Open MENU(S)

Open menu "TOOL" - "Freq. Information".



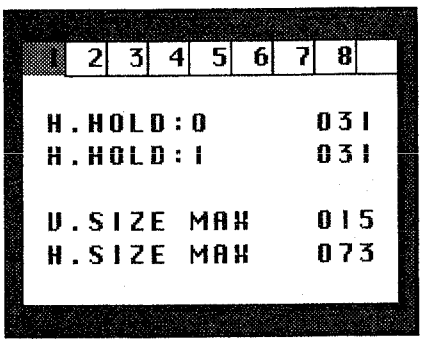
Then press "RESET" and " ", " " switch at once.





A warning message will be displayed, then press "PROCEED" switch.

"PROCEED"

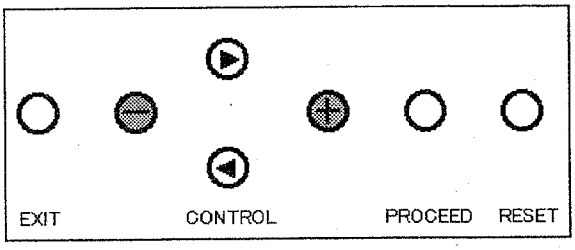


"-"

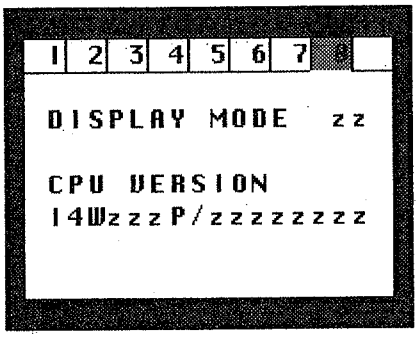
"+"

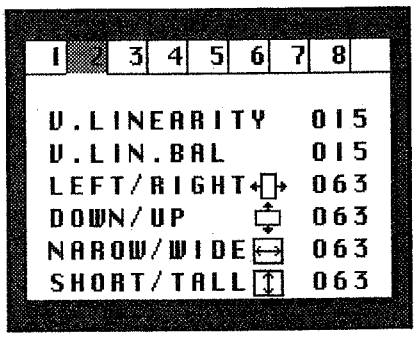
(10) How to change TAB

Press "-" or "+" switch while highlighted bar is on TAB.



"-"

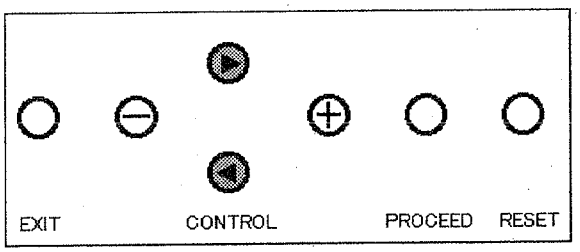


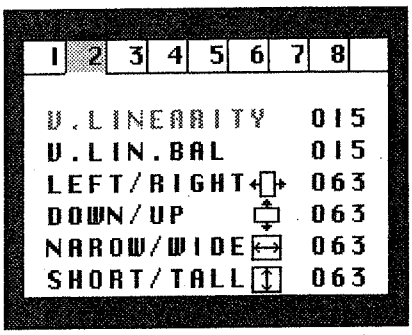


"+"

(11) Select ITEM

Press " ▶ " or " ◀ " switch.





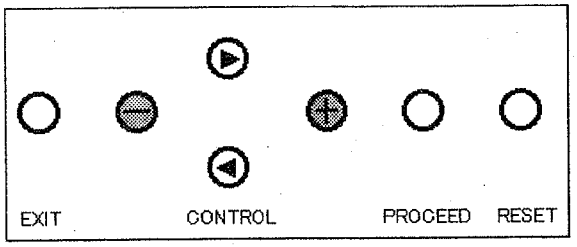
" ◀ "

"-"

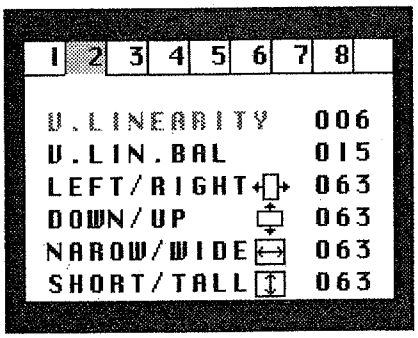
"+"

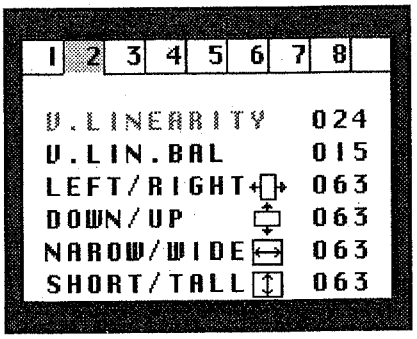
(12) Changes data value

Press "-" or "+" switch while ITEM is highlighted.



"-"

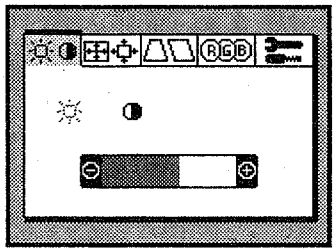




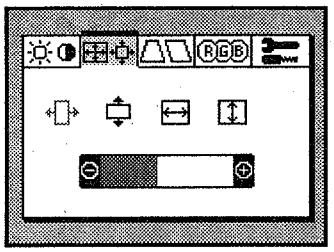
"+"

2-6-3. OSM MENU Structure

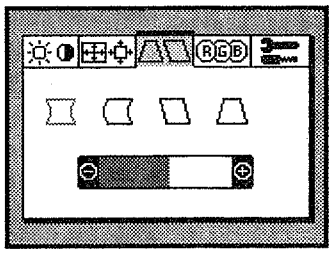
(1) MENU(U)



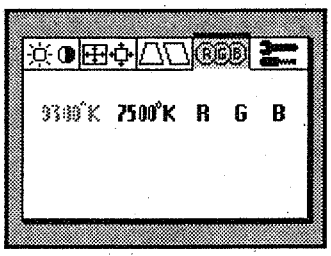
Brightness/Contrast



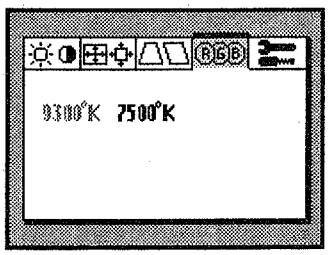
Position/Size



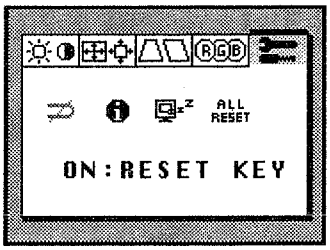
Geometry



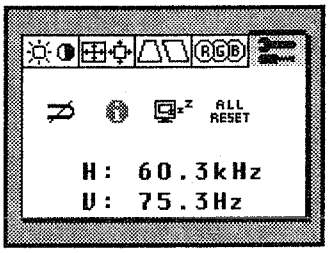
Color Control(E500/E700)



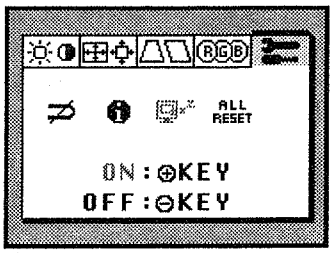
Color Select(A500/A700)



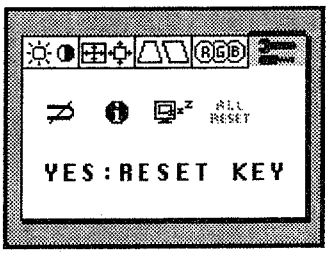
Degauss



Information

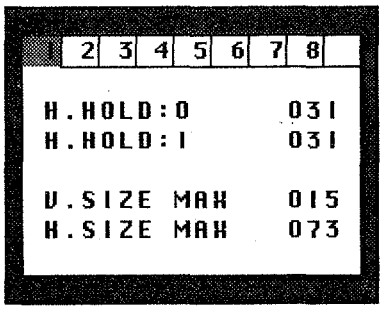


IPM

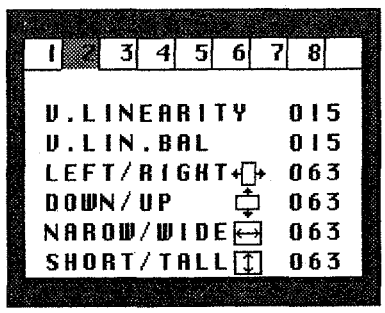


All Rest

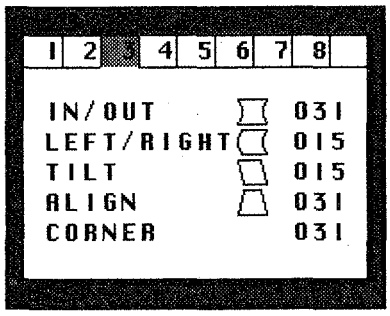
(2) MENU(S)



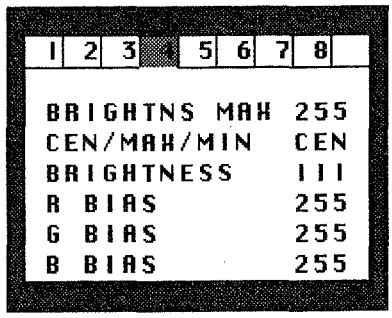
TAB1



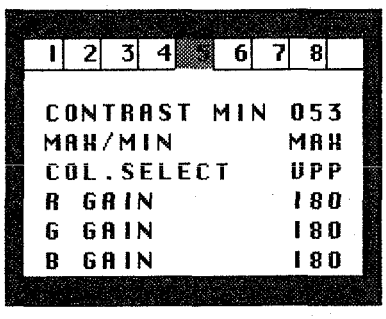
TAB2



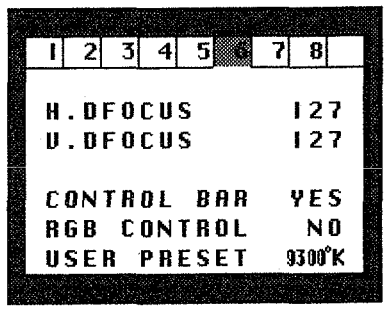
TAB3



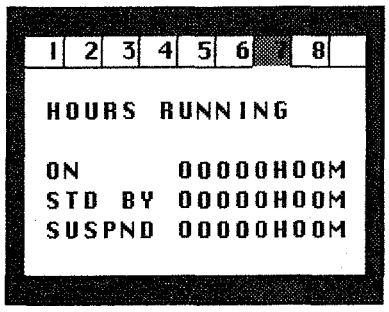
TAB4



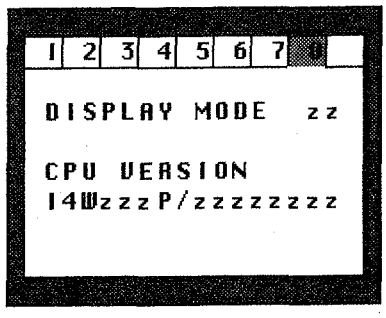
TAB5



TAB6



TAB7



TAB8

NOTE

Set the factory mode to OFF (User Mode) after completing adjustment.

2-6-4. Factory Preset

FACTORY PRESET

TAB	ITEM	Preset Value
Brightness/Contrast	Brightness	NEARLY CENTER
	Contrast	MAX
Position/Size	ALL ITEMS	Set to factory preset value
Geometry	ALL ITEMS	Set to factory preset value
Color Control (E500/E700)	9300°K,7500°K	E500...7500°K E700,..9300°K
	R/G/B	E500...Same value as 7500°K E700...Same value as 9300°K
Color Select (A500/A700)	9300°K,7500°K	A500...7500°K A700...9300°K
Tool	Degauss	-
	Freq. Information	-
	IPM	YES
	All Reset	-

2-6-5. EEPROM Data

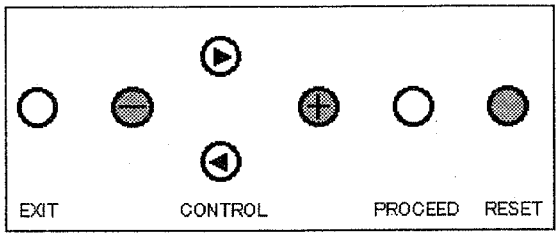
EEPROM DATA(E500/E700/A500/A700)

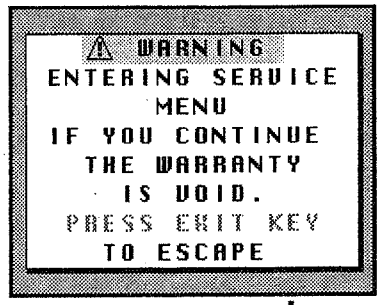
TAB	ITEM	Bytes
TAB1	H.HOLD : 0	1
	H.HOLD : 1	1
	V.SIZE MAX	1
	H.SIZE MAX	21 preset + 18 user = 39
TAB2	V.LINEARITY	1
	V.LINEARITY BALANCE	1
	LEFT/RIGHT	21 preset x2(backup) + 18 user = 60
	DOWN/UP	21 preset x2(backup) + 18 user = 60
	NARROW/WIDE	21 preset x2(backup) + 18 user = 60
	SHORT/TALL	21 preset x2(backup) + 18 user = 60
TAB3	IN/OUT	1 preset + 1 user = 2
	LEFT/RIGHT	1 preset + 1 user = 2
	TILT	1 preset + 1 user = 2
	ALIGN	1 preset + 1 user = 2
	CORNER	1
TAB4	BRIGHTNESS MAX	1
	CENTER/MAX/MIN	NOT MEMORIZED
	BRIGHTNESS	1
	R BIAS	1
	G BIAS	1
	B BIAS	1
TAB5	CONTRAST MIN	1
	MAX/MIN	NOT MEMORIZED
	COLOR SELECT	1
	R GAIN	1 factory + 2 preset + 1 user = 4
	G GAIN	1 factory + 2 preset + 1 user = 4
	B GAIN	1 factory + 2 preset + 1 user = 4
TAB6	H.D FOCUS	1
	V.D FOCUS	1
	CONTROL BAR	1
	RGB CONTROL	1
	USER PRESET	1
TAB7	HOURS RUNNING : ON	3
	HOURS RUNNING : STAND BY	3
	HOURS RUNNING : SUSPEND	3
TAB8	DISPLAY MODE	NOT MEMORIZED
	CPU VERSION	NOT MEMORIZED
OTHERS	CONTRAST	1
	IPM STATE	1
	SYSTEM FLAG	1
	INITIALIZATION CHECK	2
	EDID DATA	128

2-6-6. OSM Lock Out

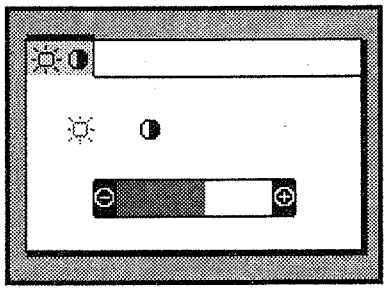
(1) How to enter the OSM lock out mode

Press "RESET" and "+", "-" switch at once when OSM MENU is not displayed.





A warning message will be displayed, then press "PROCEED" switch.

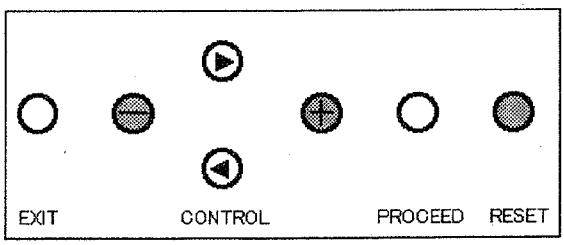


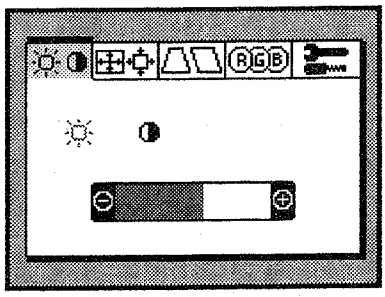
"PROCEED"

A user can operate only BRIGHTNESS and CONTRAST.

(2) How to cancel OSM lock out mode

To cancel OSM lock out mode, press "RESET" and "+", "-" switch at once when OSM MENU is not displayed. (in OSM lock out mode)





2-7. Others

(1) DEGAUSS

Turning on the Power SW, Pin 57 outputs "HIGH" level for about 3 seconds. If User selects "DEGAUSS" on OSD menu, Pin 57 outputs "HIGH" level for about 3 seconds.

Pin 57 normally outputs "LOW" level.

(2)SLOW START

Pin 47 normally outputs "LOW" level. When User turns on the Power SW or Display returns from PMS (SUSPEND mode / OFF mode), Pin 47 outputs "HIGH" level for short duration.

3. VIDEO CIRCUIT

3-1. Video Pre-amplifier

The analog video signals are received from the mini D-Sub connector pin numbers 1, 2 and 3 (Red, Green ,and Blue respectively), and then the video signals are applied to the pre-amplifier IC 711 pins 3, 13 and 8.(R, G and B). IC711 controls the following functions; the video signals mixing, blanking, contrast and white balance controls. The video signals are mixed with the OSD video signals in IC711, and output at IC711 pins 35, 25 and 30 (R, G and B). Contrast is adjusted by IC711 pin 17's voltage. White balance controls Red, Green, Blue gains respectively. Red gain is adjusted by IC711 pin 4's voltage. Green gain is adjusted by IC711 pin 14's voltage. Blue gain is adjusted by IC711 pin 9's voltage. These voltages are controlled by IC801 through IC751.

The positive polarity clamp pulse coming into IC711 pin 18 is generated from IC801. The positive polarity blanking pulse coming into IC711 pin 20 is generated from the horizontal AFC pulse of FBT. During the horizontal retrace period when the pin 20 is high level, the video output at IC711 drops to ground. The moment the received signal changes, the video output signal gets blank by the blanking signal from IC801 coming into pin 20 so that an unstable picture can disappear.

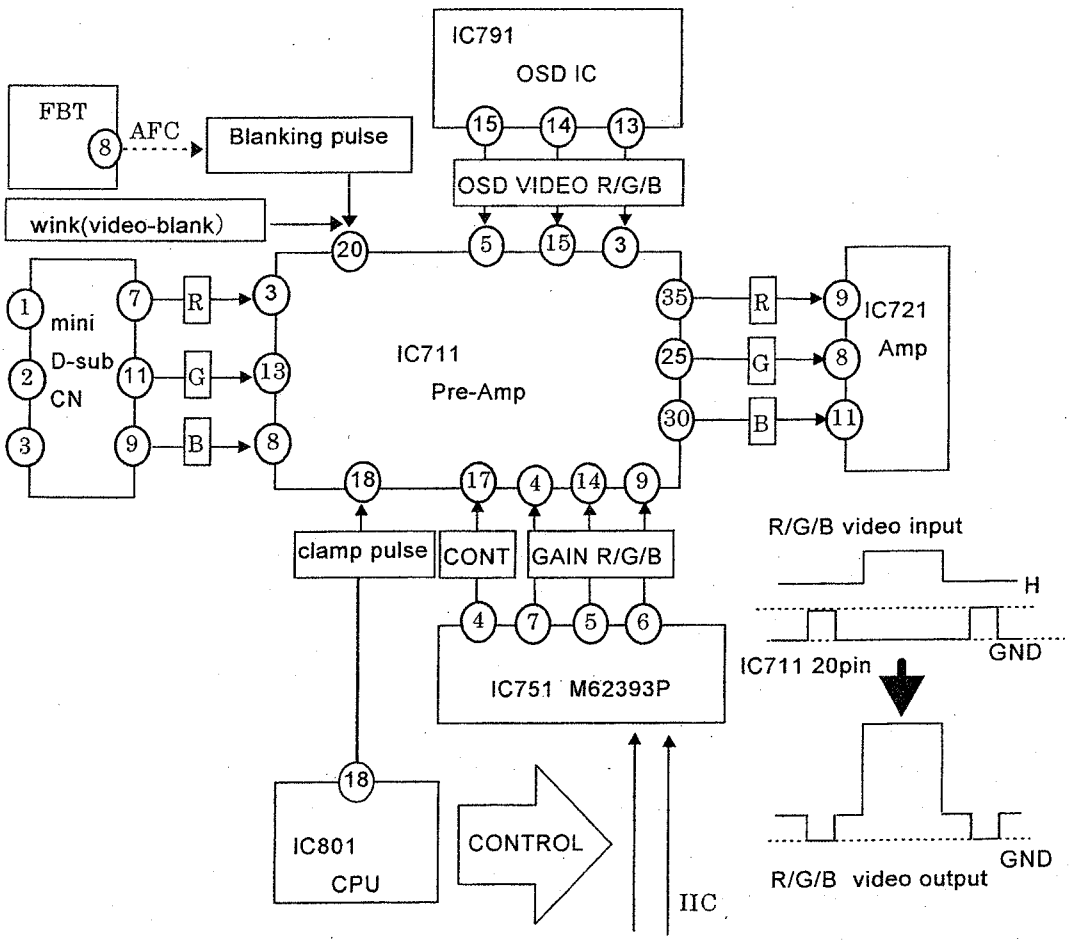


Fig. 3-1 Video Pre-amplifier

3-2. Video Bias Control Circuit

The video signals are amplified to about 42Vp-p by IC721 and then the signals are biased from IC751 through Q743R, Q743G, Q743B, Q744R, Q744G, Q744B and IC751. IC801 adjusts the bias voltage of IC751.

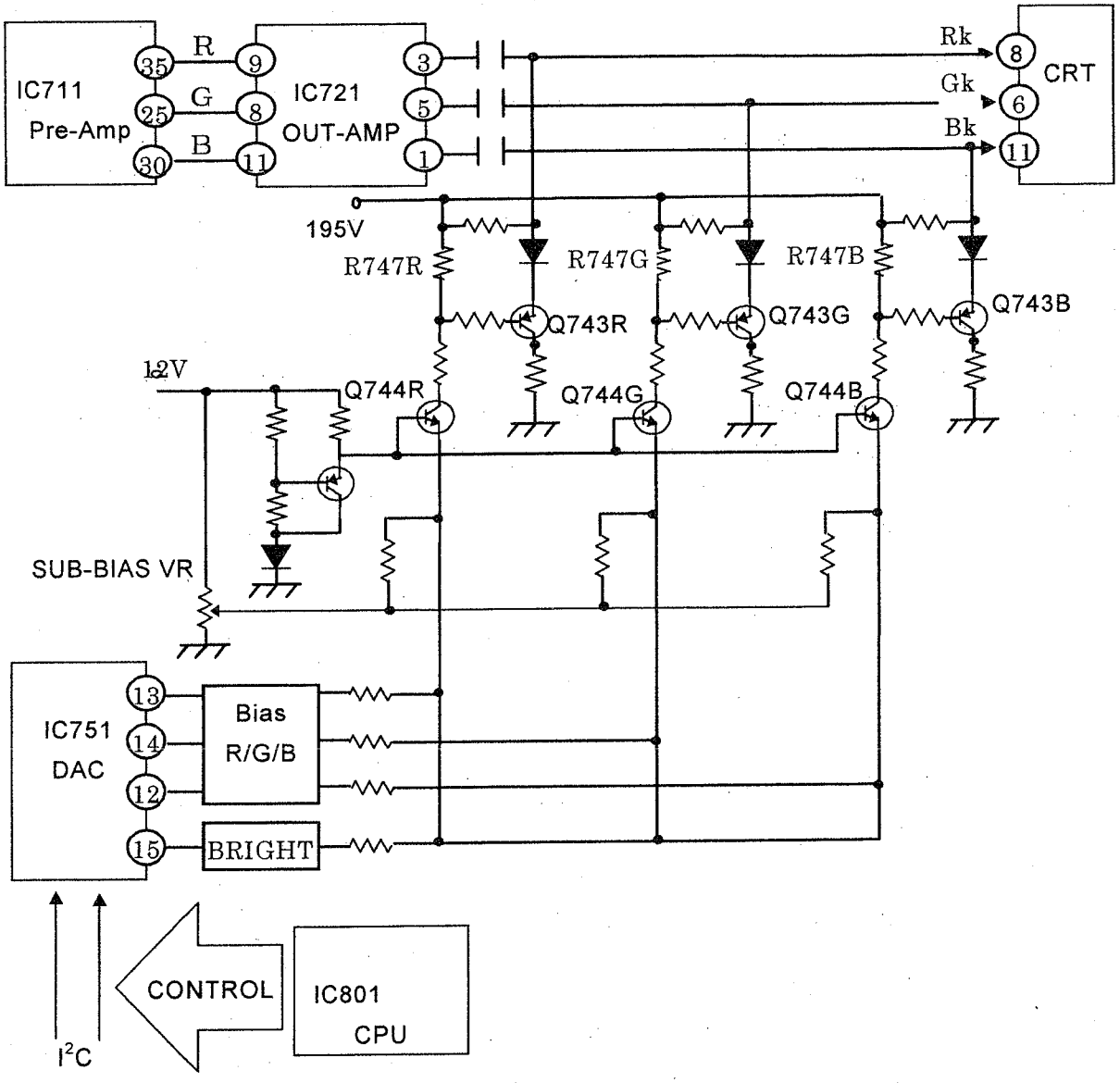
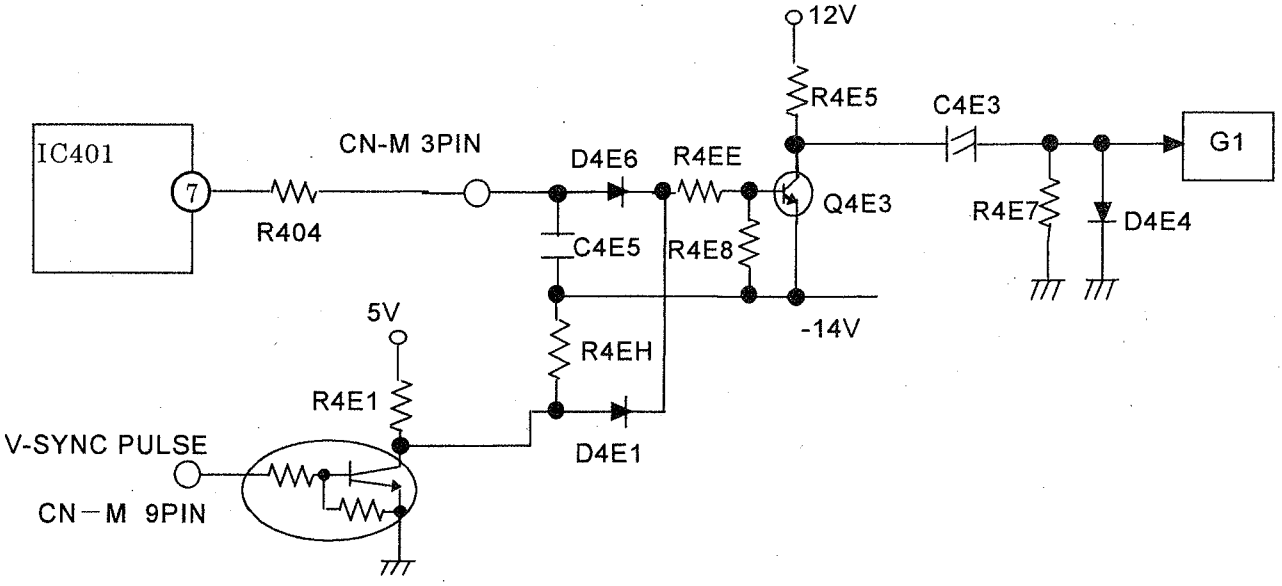


Fig. 3-2 Video Bias Control Circuit

For example, only the green video circuit will be explained here.
The raster brightness is determined by black level at CRT cathode when clamping the video output blanking DC level from IC721, and is controlled by the output voltage of IC751 pin 15.
When this voltage is changed, the current flowing into IC751 pin 15 changes and the current flowing into the collector of Q744G changes.
The DC clamp level is determined by using the voltage drop of R747 which arises from this current fluctuation.

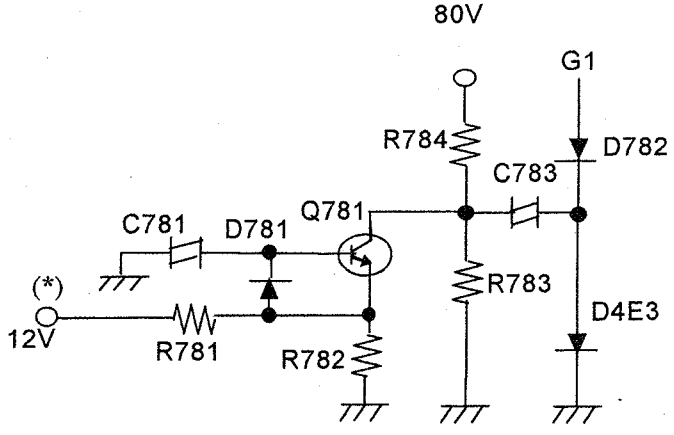
3-3. Blanking Circuit

The blanking pulse is applied from only the vertical blanking pulse.
(notice: in this circuit the horizontal blanking pulse is not used. See item No. 3-1.)
The vertical blanking pulse is generated by the pulse of IC401 pin 7 on MAIN PWB and is applied to G1 of CRT after a waveform correction by Q4E3.
Therefore during the vertical retrace period, the voltage of G1 becomes close to -26V and then the raster is blanked.



3-4. Spot Killer

This circuit protects the CRT against the spot brightness in the following process. When the 12 volts(*) line drops, the emitter voltage of Q781 drops. Then Q781 is turned on, and G1 voltage becomes close to -60Vdc, eliminating the single spot from appearing on the CRT.



3-5. ABL (Automatic Brightness Limiter) Control Circuit

The ABL circuit limits the amplitude of the video signal and causes the maximum average current flowing to the CRT to control to 500 μA or less. When the anode current is under 500 μA, the voltage of CN-B pin 4 is clamped to 12.6V by D771. If the anode current attempts to exceed 500 μA, the voltage drop of R5U1 causes the voltage of CN-B pin 4 to drop to a voltage less than 12.6V and then Q771 is activated. Once Q771 is activated, the collector voltages of Q772 and Q773 will decrease and then the video pre-amp (IC711) output swing (Vp-p) decreases including the OSD output level.

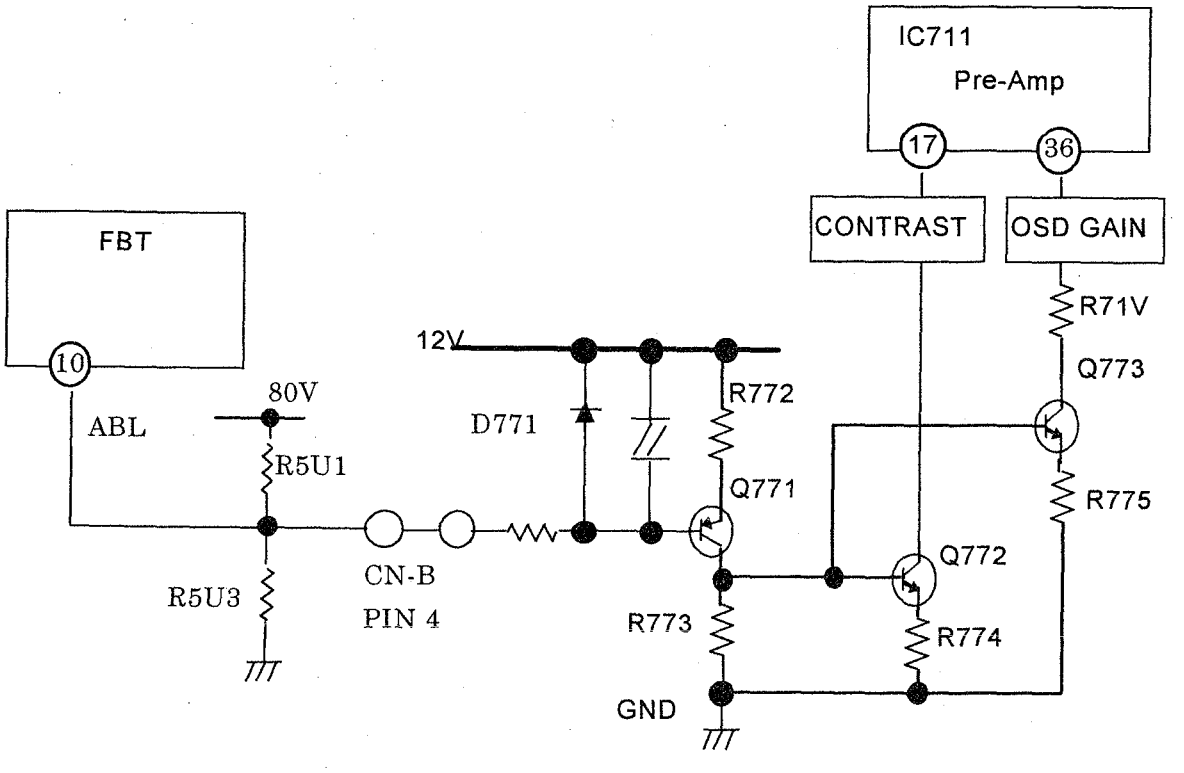


Fig. 3-3 ABL Control Circuit

4. HORIZONTAL DEFLECTION AND HIGH VOLTAGE CIRCUIT

4-1. Horizontal Oscillator / Horizontal Image Phase Shifter Circuit

The controls of the horizontal oscillation circuit and the horizontal image phase shifter circuit are done by IC501. The internal functions of IC501 control the following circuits.

- Polarity normalization of horizontal sync signal
- Detection of horizontal sync signal
- Sync separator for Sync-on-Green signal
- Horizontal oscillation circuit (H-OSC)
- AFC1 circuit
- AFC2 circuit
- Duty cycle variable circuit
- Horizontal image phase shifter circuit
- Parallelogram correction circuit
- Side pin balance correction circuit

4-1-1. Horizontal Oscillator

When the separate horizontal sync or the composite sync is input to IC501 pin 26, a horizontal dummy sync is generated in IC501. The dummy sync and I^2C serial data at pin 3 determine a frequency of the horizontal oscillation pulse. The horizontal oscillation pulse and FBP at 17 pin determine frequency of "H-OUT" pulse (0.7 Vp-p) which is output from pin 18. The "H-OUT" pulse is applied to the horizontal drive circuit. The duty ratio of the output pulse is regulated to approximately 50% by the I^2C serial data at pin 3.

4-1-2. Horizontal Image Phase Shifter Circuit

The "H-OUT" pulse which is output from IC501 pin 18 is supplied to the horizontal drive circuit and its delay shifts the horizontal position of the picture. Its is controlled by the I^2C serial data at pin 3.

4-2. Horizontal Drive Circuit

H drive pulse supplied from IC501 pin 18 is inverted by Q523 and buffered by Q521 and Q522. The buffered drive pulse is supplied to the gate of Q553 which is H drive transistor to drive deflection and high voltage output circuit by turning on and off. Q553 turns on and off the current of T551's primary winding, therefore the secondary current generated on secondary winding is supplied to Q561 base. T551 is a drive transformer to supply Q561 base current .

4-3. Distortion Correction Circuit

4-3-1. Correction Circuit of Side Pincushion Distortion, Vertical Trapezoid Distortion and Side Pincushion Corner Distortion

The E/W wave form which is output from IC501 pin 9 is supplied to the horizontal size control circuit and corrects the side pincushion distortion, vertical trapezoid distortion and the side pincushion corner distortion. Its wave form is controlled by the I^2C serial data at pin 3.

4-3-2. Correction Circuit of Parallelogram Distortion and Side Pin Balance Distortion

The "H-OUT" pulse which is output from IC501 pin 18 is supplied to the horizontal drive circuit and its vertical cycle delay corrects the parallelogram distortion and side pin balance distortion. Its is controlled by the I^2C serial data at pin 3.

4-4. Horizontal Deflection And High Voltage Output Circuit

4-4-1. Horizontal Deflection Output Circuit

The drive pulse is applied to the base of Q561 turning it on and off. The saw-tooth wave form deflection current is generated in the deflection yoke and high voltage is generated in the second winding of the FBT(T5R1). The AFC pulse and HV protector detection voltage is generated in the third winding. This deflection current sweeps the beam in the horizontal direction. This horizontal deflection circuit consists of the combination of a main and auxiliary generator. (This deflection circuit is called Diode Modulation Circuit) The main generator consists of deflection yoke, Q561, D561, C561, L571 and C572 the auxiliary generator consists of modulation coil L562, C562, C563, Q591 and D562.

By varying the voltage of C563 at auxiliary generator, the main circuit can vary horizontal size and pincushion distortion. L571 is the horizontal linearity coil to balance left and right the horizontal linearity. C572, C573, C574, C575 and C576 correct for the "S" characteristic and change the parabolic wave form generator at both ends of the capacitor by the inflow current.

H frequency (kHz)	C572	C573 /Q571	C574 /Q572	C575 /Q573	C576 /Q574
		Fh4	Fh3	Fh2	Fh1
30k ~ 34k	ON	OFF	ON	ON	ON
34k ~ 36.5k	ON	OFF	ON	OFF	ON
36.5k ~ 40k	ON	OFF	OFF	OFF	ON
40k ~ 44k	ON	OFF	ON	ON	OFF
44k ~ 47.5k	ON	OFF	OFF	ON	OFF
47.5k ~ 51k	ON	ON	ON	OFF	OFF
51k ~ 55k	ON	OFF	ON	OFF	OFF
55k ~ 67k	ON	ON	OFF	OFF	OFF
67k ~ 69k	ON	OFF	OFF	OFF	OFF

The fly-back pulse width of C561 is determined by the DY' induction, other inductors and the capacity of resonance capacitor C561. This pulse width is about 2.6 us. Input supply voltage of FBT pin 2 (≒C5G3 Voltage) varies depending upon frequency. The pulse level is approximately constant in all frequency by negative feedback of high +B chopper circuit. Therefore the high voltage regulation is constant in all frequencies. The duration of the pulse generated at C562 is approximately 2.6 us or less than 2.6 us. This pulse level changes by varying C563's voltage by manipulating the horizontal width control and side pincushion control circuit. As C563's voltage decreases the horizontal width increases.

The horizontal size (horizontal deflection current) is defined as the difference between the C5G3 and C563' voltages when the high voltage is constant. C563 follows the high +B voltage to maintain constant horizontal size despite beam fluctuations by horizontal control circuit.

4-4-2. High Voltage Circuit

Q561 turns on and off generating the fly-back pulse on the FBT's primary winding. The FBT boosts this pulse in the second winding to about 25 kV (high voltage) and supplies it to the CRT's anode. The AFC pulse and protector detection voltage are generated in the third winding of FBT. The high voltage is divided by FBT's internal resistors, R5T1 and VR5T1. The detection voltage is supplied to high +B control circuit (IC591) to keep constant high voltage by negative feed-back loop.

4-5. Horizontal Size Control Circuit

Horizontal size is varied by the voltage of C563. The circuit to control this voltage is composed of IC591, Q591 and Q592. The H size user control DC voltage added IC591 6 pin. IC591 pin 5 is supplied +B divided voltage by R591 and R59C to keep constant H.size for change of +B. H.size (horizontal deflection current) is defined C563 voltage which is nearly defined IC591 pin 7 voltage, R592 and R593 by following formula and +B voltage.

$$VM = \{(R592 + R593) / R593 \}^* V7$$
$$Iy = (+B - VM) / LH$$

VM(v) : C563 voltage
V7(v) : IC591 7 pin voltage
Iy(App) : horizontal deflection current
LH(H) : horizontal yoke inductance

Therefore the horizontal size can be expanded by decreasing C563 voltage and can be reduced by increasing C563 voltage.

4-6. H Centering Circuit

Switching regulator generates the floating 5 volts which is compared to the deflection circuit power supply voltage (high +B voltage). This voltage is divided by VR581 (H centering) and is supplied to the base of Q581. The voltage differences of Q581's base and emitters is supplied to L581.
Horizontal centering is manipulated by the current supplied by L581 to the horizontal deflection circuit.

4-7. High +B Chopper Circuit

High +B chopper circuit consists of the PWM (Pulse Width Modulation) generator, error amplifier and step down chopper circuit. This circuit forms negative feedback loop to maintain constant high voltage.

4-7-1. High +B Chopper Controller

This circuit controls the rectangular wave output duty cycle which is output from IC501 pin 14.
Operational amplifier in IC5H1 works as error amplifier which determines feed back loop gain.
The error voltage is output from IC5H1 pin 1 and is supplied to IC501 pin 13. IC501 pin 14 outputs the rectangular wave voltage. The duty cycle of this rectangular wave varies by error voltage to keep constant high voltage and is supplied to Q5G1 gate through Q5G2 and Q5G3.

4-7-2. High +B Chopper Output

This step down chopper circuit consists of Q5G1, D5G3, L5G2 and C5G3. Q5G1 turns on and off by adding rectangular wave voltage to Q5G1's gate and its source supplies 195 Vdc, therefore, a 195 Vp-p rectangular wave is generated on Q5G1's drain and this is rectified by D5G3, L5G2 and C5G3. Therefore, the rectified voltage is added to the horizontal deflection circuit and operates by varying duty cycle.

4-8. Protector Circuit

This model employs three separate protection circuit as follows.

a. The first protect circuit becomes active when the FBT high voltage increases abnormally. (HV Protector)
b. The second circuit becomes active when the power supply input current to the FBT's primary side increases abnormally. (Leak Protector of FBT Primary Side)
c. The third protect circuit monitors the second side of the FBT and becomes active in the event of a FBT layer short. (Leak Protector of FBT Second Side)

4-8-1. HV Protector

The HV protector consists of R2002, R2003, R2004, ZD2001, D2002 and thyristor circuit (R2006, R2007, R2008, Q2002, Q2003). The output pulse at the FBT pin 5 is rectified by D2001 and C2001, whose pulse increases as the HV increases, and is divided by R2002, R2003 and R2004.
When the rectified HV voltage increases abnormally, ZD2001 is reversed biased and conducts and then thyristor circuit is turned on.
Thyristor circuit turns on when its input voltage exceeds 0.62 volts. This thyristor circuit is active and will remain active until the power supply voltage decreases.
When this circuit is active, horizontal drive pulse stops and the high voltage decreases to 0 volts.

4-8-2. Leak Protector of FBT Primary

Leak protector of FBT primary consists of R5F1, C5F1, Q5F1, R5F3 and thyristor circuit. If the input power supply current increases abnormally, the voltage across R5F1 increases. When the voltage across R5F1 increases and Q5F1's base emitter voltage exceeds 0.55 volts, Q5F1 is turned on and thyristor circuit is turned on.

4-8-3. Leak Protector of FBT Secondary

Leak protector of FBT's secondary consists of ZD2002, Q2001 and thyristor circuit. When the current in the second winding of FBT increases abnormally, the voltage of FBT pin 10 decreases. When the voltage becomes about 0 volts, ZD2002 conducts and Q2001 turns on. Therefore thyristor circuit turns on.

5. VERTICAL DEFLECTION CIRCUIT

The vertical deflection circuit consists of the following blocks:

1. Saw tooth wave form generator and wave form correction circuit
2. Vertical output amplifier circuit

5-1. Saw tooth Wave Form Generator and Wave Form Correction circuit

5-1-1. Vertical Oscillator

When the separate vertical sync is input to IC501 pin 28 or the composite sync is input to IC501 pin 26, the saw tooth wave form is output from IC501 pin 8. Its frequency is same as the input sync frequency.

5-1-2. Vertical Size Control Circuit

The saw tooth wave form is output from IC501 pin 8 is supplied to the vertical output amplifier circuit and its amplitude controls a vertical size of the picture.
Its is controlled by the I^2C serial data at pin 3.

5-1-3. Vertical Raster Position

The saw tooth wave form is output from IC501 pin 8 is supplied to the vertical output amplifier circuit and its DC voltage controls a vertical raster position. Its is controlled by the I^2C serial data at pin 3.

5-1-4. Vertical Linearity

The saw tooth wave form is output from IC501 pin 8 is supplied to the vertical output amplifier circuit and corrects a vertical linearity. Its is controlled by the I^2C serial data at pin 3.

5-2. Vertical Output Amplifier Circuit

The current proportional to the input voltage to IC401 is supplied to the vertical deflection coil (V-DY). The vertical deflection current is taken as voltage wave form by R410 and feedback to IC401.

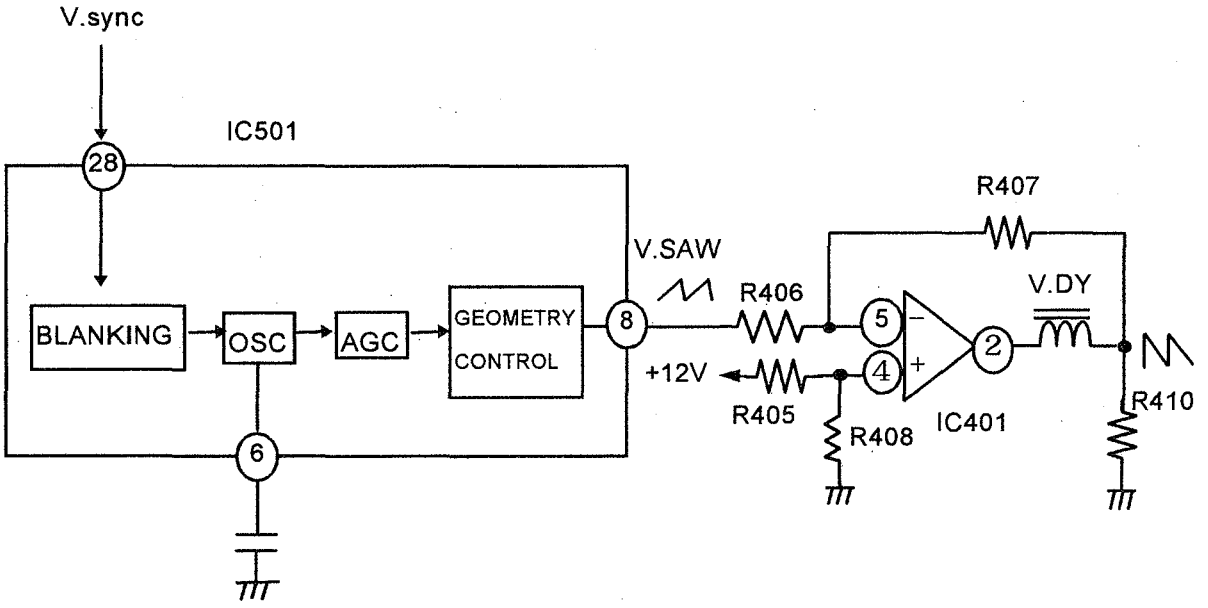


Fig. 5-1 Vertical Deflection Circuit

6. DYNAMIC FOCUS CIRCUIT

The dynamic focus section is consists of following three blocks:
The dynamic focus (D-FOCUS) IC (IC961) has the function of generating the horizontal/vertical parabolic wave as well as that of controlling the gain, the output amplifier, and the coupling circuit.

6-1. Horizontal Parabolic Wave Generation and Gain Control Circuit

The AFC pulse which is generated by the FBP (fly back pulse) of the secondary winding of the horizontal output transformer(T551) is shaped and input to IC961 17 pin (AFC). This pulse is used as a trigger and a sawtooth wave is generated at the sawtooth oscillator section in IC961.
The sawtooth wave is converted to a parabolic wave at the X`2 circuit and the parabolic wave gain is adjusted with the pin 6 input voltage (VR961). To set the peak voltage of this parabolic to an optimum amplitude with respect to the horizontal frequency and horizontal size, tracking is taken at the pin 19 input voltage (DF_SIZE), i.e., the horizontal dynamic focus voltage. The final horizontal parabolic wave is output from pin 7.

6-2. Vertical Parabolic Wave Generation and Gain Control Circuit

The vertical sawtooth wave produced by the oscillator IC (IC501) is input to IC961 pin 2 (V_SAW) and is converted to a parabolic wave in the X`2 circuit in IC961. The gain of this parabolic wave is controlled by the pin 5 input voltage(VR962), i.e., the vertical dynamic focus voltage. The result is output to pin 4.

6-3. Output Amplifier Circuit and Coupling Circuit

The horizontal and vertical parabolic waveforms are generated at IC961 and are clamped before each output circuit for wide dynamic range of the output circuit. The clamp voltage is determined by the voltages of R980 (vertical) and ZD982 (horizontal). After the clamp circuit, the horizontal parabolic waveform is amplified by Q981. The output waveform at Q981 is input to T981 via the buffer circuit which is comprised of Q982, Q983, Q991 and Q992. The gain of T991 is approximately 8.
The vertical parabolic waveform is amplified by Q987. The output waveform at Q987 modulates the secondary winding of T991 as the vertical parabolic waveform. Therefore, T981 outputs the horizontal parabolic waveform which is modulated by the vertical waveform. This modulated waveform is input to the CRT focus grid via the built-in capacitor of T5R1 (F.B.T.).

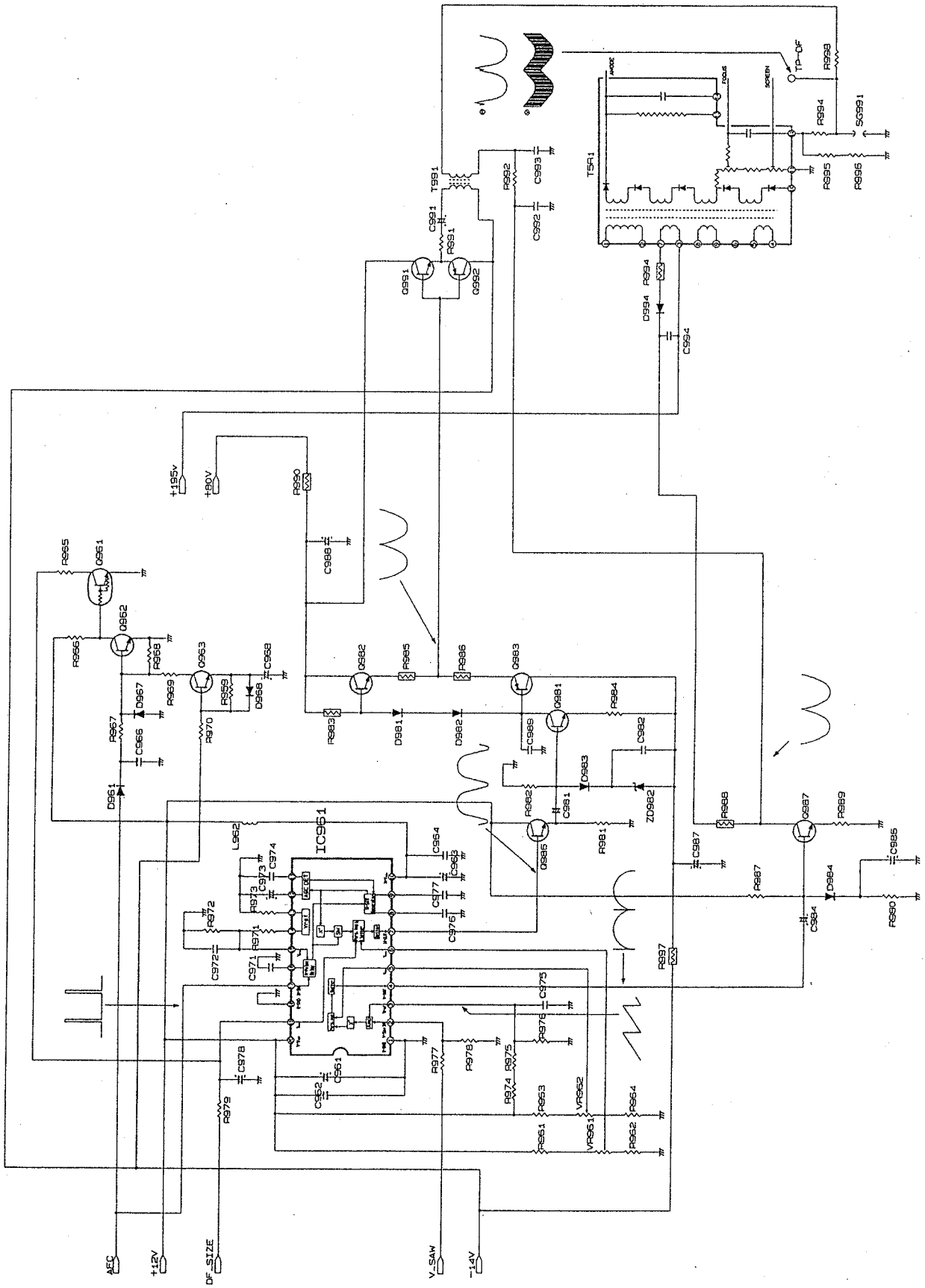


Fig. 6-1 Dynamic Focus Circuit

REPLACEMENT PARTS LIST

The components specified for Model JC-1736VMA

Note: The components identified by ⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33017581	CRT M41LHA128X401(F4)
*** ICS ***		
IC811	37005277	IC PQ05RR13 (REG)
IC7G1	37005297	IC PQ12RD11
IC401	37006025	IC LA7840
IC501	37009037	IC UPC1885CT
IC5H1 IC591	37011350	IC KIA358P (OP-AMP)
IC961	37011362	IC M52723SP-700
IC621	37011366	IC KIA3842P
IC803	37055537	MOS NM24C04EN
IC751	37076176	MOS M62393P
IC671	37076357	IC SE080N(LF12)
IC791	37076360	MOS LSC4343P
IC711	37076367	IC M52737SP
IC721	37076368	IC LM2405T
IC801	37076373	MOS HD6433214WA04P
*** TRANSISTORS ***		
Q742 Q771 Q871	35AB0011	TR 2SA812-T1B M5
Q4E3 Q714 Q772	35CB0011	TR 2SC1623-T1B L5
Q773 Q873 Q962		
Q963		
Q712B Q712G Q712R	35CB2410	TR 2SC3082K-T146
Q791		
Q4E4	35EB0230	TR DTC114EKA-T146
Q872	35EB0232	TR DTC144EKA-T146(0°)
⚠Q5F1 Q743B Q743G	350A1500	TR 2SA1767-TA
Q743R		
Q983	350A2001	TR 2SA1038S-TP R
Q630	350D7216	TR 2SC945-T P
⚠Q2003 Q5E1 Q562	350D7217	TR 2SC945-T Q
Q521 Q523 Q531		
Q628 Q631 Q632		
Q671		
Q986	350E3218	TR 2SC1740S-T R
Q581 Q7F1	350G1017	TR 2SD2005-T105 Q
Q781	350H4418	TR,2SC1473-TA R
Q821	350H5017	TR,2SC3811-TA Q

SYMBOL	PARTS NO	DESCRIPTION
⚠D2002 D2003 D2004 D4E1 D4E3 D4E4 D4E6 D5E1 D5E2 D5G1 D5G2 D5H4 D521 D522 D523 D524 D525 D526 D627 D630 D631 D632 D658 D701B D701G D701R D702B D702G D702R D71E D71F D771 D781 D782 D874 D875 D961 D967 D968 D981 D982 D983 D984	360K1025	DIODE 1SS133
ZD601	360K3129	DIODE,RD27EB(4)-T4
ZD531	360K3630	DIODE RD4.7ESB(1)-T4
ZD982	360K3639	DIODE RD5.6ESB(2)-T4
ZD7F1	360K3648	DIODE RD6.8ESB(3)/ESAB(3)
⚠ZD2001	360K3652	DIODE RD7.5ESB(3)-T4
⚠ZD2002	360K3675	DIODE RD13ESB(2)-T4
⚠ZD2003	360K3699	DIODE RD24ES AB1-T4
ZD628	360K3702	DIODE RD24ESB(4)-T4
D602	361K7174	DIODE RU1P V1

SYMBOL	PARTS NO	DESCRIPTION
Q744B Q744G Q744R	350J5205	TR 2SC3415S-TP
Q982	350J5241	TR 2SC2389S-TP R
Q987	350J5263	TR 2SC4620 Q-TV2
Q101 Q102 ⚠Q2002	350K3517	TR 2SA733/2SA733A-T Q
Q5G3 Q522 Q592		
Q627 Q633		
Q992	35029992	TR 2SB1569A E
Q591	35072710	TR 2SD1897
Q991	35072732	TR 2SD2400A E
⚠Q561	35095210	TR 2SC5299
Q981	35095382	TR 2SC3478A K
⚠Q2001	351G0570	TR DTA144ESA-T
Q5H1 Q525 Q526	351G0577	TR DTC144ESA-T
Q527 Q575 Q576		
Q577 Q578		
Q524 Q801 Q961	351G0580	TR DTC114ESA-T
Q5G1	35127470	TR 2SJ306
Q553	35127630	TR 2SK1904
⚠Q571 ⚠Q572	35127920	TR 2SK2520-01MR
⚠Q601	35128009	TR 2SK2645-01MR(F111)
⚠Q573 ⚠Q574	35128012	TR FS10KMJ-2
Q103 Q104	355D2715	TR BA1A4M
*** DIODES ***		
ZD5E1	360A0038	DIODE MTZJ5.6A T-72
ZD7A1 ZD7A2 ZD8A1 ZD8A2	360A0043	DIODE MTZJ6.2B T-72
ZD741	360A0046	DIODE MTZJ6.8A T-72

SYMBOL	PARTS NO	DESCRIPTION
D621 D622	361K7523	DIODE ERA15-04V1
⚠D2001	361K7562	DIODE EGP10G G23
D603 D629 D656	361K7723	DIODE UF4003 G23
D572 D573 D574	361K7754	DI 1SR139-600 T31
D575		
D724B D724G D724R D725B D725G D725R D742B D742G D742R D762	361K7777	DIODE 1SS244-T72
D871 D872 D873	361K8252	DI RB721Q-40T72
D551	36107293	DIODE RK14
D5G3 D552	36107518	DIODE RG2
⚠D561	36107750	DIODE ESC023M-15
⚠D562	36107764	DIODE ERD09-15J9
⚠D601	36107783	DIODE KBL405G-FA1
D651	36107784	DIODE ERC38-06L
D652	36107785	DIODE ERC38-04L
D653	36107786	DIODE ERC91-02L
D654 D655	36107787	DIODE ERB93-02E
LED101	36801021	LED SML19416W-LF38
LED601	36801397	LED SEL1915CAM-LF58(C,D)
D401 D5H1 D571	369K2136	DIODE RGP10G,AT
D71H D741	380K5054	VARISTOR MA29W-A (TP)
⚠TH603	38102046	THERMISTOR 902P61D050MP14
⚠TH602	38102074	THERMISTOR SCK-054L
⚠PC601 ⚠PC602 ⚠PC603	38200354	PHOTOCOUPLER PC123FY2
*** TRANSFORMERS ***		
⚠T551	45804027	TRANS,H.DRAIVE (W509B)
T991	45950003	D.F.TRANS
L5G2	46206020	CHOKE COIL 3MH (E128)
⚠T601	46309608	SWITCHING TRANS
⚠T5R1	47105722	FBT
*** VARIABLE RESISTORS ***		
VR961 VR962	410G1313	R,VARIABLE B10K
VR581	410G1407	R,VARIABLE B1K
VR743	410G2156	R,VARIABLE B2K
⚠VR5T1	415K5162	R,VARIABLE 100K

SYMBOL	PARTS NO	DESCRIPTION
*** RELAYS & SWITCHES ***		
SW581	65161081	SWITCH SLIDE 00220867
SW101 SW102 SW104 SW105 SW106	653F0067	TACT SWITCH PCO 05K
SW103	65360047	TACT SWITCH KSM0642A
⚠SW601	65360071	PUSH SWITCH ESB92S21B
⚠RL601	65660047	RELAY RPEF-12
*** COILS & FILTERS ***		
LC7A1 LC7A2 LC701B LC701G LC701R LC761	390J9027	FILTER ZJSC-R12-100TA
⚠L562	60906071	COIL,WIDTH 90UH
⚠L571	60919165	COIL,H.LIN 22.5T
L602	610E1729	COIL,FILTER 100UH
L723B L723G L723R	610E4029	COIL,FILTER 0.39UH
⚠L561	610F3014	COIL,FILTER 3.3UH
L5G1	610F3025	COIL,FILTER 47UH
L901	610F7018	COIL,FILTER 12UH
L501 L502 L962	610F7022	COIL,FILTER 27UH
L762	610F7518	COIL,FILTER 12UH
L761 L763	610F7525	COIL,FILTER 47UH
L654 L655	610G0320	CHOKECOIL TSL0809RA-330K1
L653	610G0333	CHOKECOIL TSL1112RA-330K2
L601 L657 L658 L659 L660 L661 L662	610J9021	COIL BEADS (ZBF503D-00TA)
L551	610J9125	COIL,FILTER 220K LHL10TB
⚠L5R1	610J9130	FILTER COIL SPT0406A100K
⚠FL602	61062237	COIL,FILTER (96189-A)1MH
⚠FL601	61062238	COIL,FILTER(96190-A)4.5MH
L581	61070322	COIL,CHOKE 4MH
X501	61111015	CERAMIC OSC CSB500F2
⚠DEG	61317115	DEGAUSSING COIL (25.8H 13
L721B L721G L721R	616J9019	FERAITE BEADS HF55BTL
LC762	616K6027	NOISE FILTER 2A222-TA
LC744 LC766	616K6028	NOISE FILTER 1H223X-TA
D5G3	61605135	FERRITE CORE

SYMBOL	PARTS NO	DESCRIPTION
*** RESISTORS ***		
J751 J752 J753	40AAD100	R,CHIP 0.0H 5% 1/2W
R761	40AAD149	R,CHIP 100H 5% 1/2W
J4E2 J7A1 J7A2 J7A8 J7E2 J7E3 R74AG	40AA1000	R,CHIP 0H 5% 1/8W
R713 R752 R753	40AA1149	R,CHIP 100H 5% 1/8W
R717B R717G R717R	40AA1153	R,CHIP 150H 5% 1/8W
R716B R716G R716R R774	40AA1163	R,CHIP 390H 5% 1/8W
R718B R718G R718R	40AA1165	R,CHIP 470H 5% 1/8W
R773 R878	40AA1173	R,CHIP 1.0K 5% 1/8W
R4E1	40AA1177	R,CHIP 1.5K 5% 1/8W
R4EE	40AA1187	R,CHIP 3.9K 5% 1/8W
R4EH	40AA1197	R,CHIP 10K 5% 1/8W
R782	40AA1199	R,CHIP 12K 5% 1/8W
R74CB R74CG R74CR	40AA1210	R,CHIP 36K 5% 1/8W
R747B	40AA1231	R,CHIP 270K 5% 1/8W
R873 R874	40AA1253	R,CHIP 2.2M 5% 1/8W
R906	40AA2221	R,CHIP 100K 5% 1/4W
J4E1 J7A5 J7E1 J7E4 R71V R723B R723G R723R R74AB R74AR R755B R755G R755R R776 R972	40AA3000	R,CHIP 0.0H 5% 1/10W
R582 R754	40AA3125	R,CHIP 10H 5% 1/10W
R974	40AA3141	R,CHIP 47H 5% 1/10W
R581 R712 R721B R721G R721R R722B R722G R722R R726B R726G R726R R74FB R74FG R74FR R965	40AA3149	R,CHIP 100H 5% 1/10W
R871 R872	40AA3161	R,CHIP 330H 5% 1/10W
R775	40AA3167	R,CHIP 560H 5% 1/10W
R71A R728G R728R R790 R796 R969	40AA3173	R,CHIP 1.0K 5% 1/10W
R74KG R797	40AA3177	R,CHIP 1.5K 5% 1/10W
R728B	40AA3179	R,CHIP 1.8K 5% 1/10W
R711 R792 R791	40AA3181	R,CHIP 2.2K 5% 1/10W
	40AA3185	R,CHIP 3.3K 5% 1/10W

SYMBOL	PARTS NO	DESCRIPTION
*** PWB ASSYS ***		
	84R96F01	MAIN PWB ASSY
	84R96J01	CRT PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
SG901 SG902 SG903 SG904	329JK047	ARRESTER
SG901 SG902 SG903 SG904	329J0047	ARRESTER (300V),AT52
CN-GND	32990205	INSULATING CAP TIC-3.5(
X801	64099224	X'TAL OSC AT-49(16MHZ)
⚠F601	66699064	FUSE UL(ET) 250V 4A
SG905 ⚠SG991	667K6007	SPARK GAP 1.5KV
⚠CNCRT	70032064	CRT SOCKET HPS3200-010520
⚠IN601	70521069	INLET SK-1019(DELTA)
CORD	70810778	POWER CORD U-3 L1.8 GRY,S
CABLE	73893244	SIGNAL CABLE MD15-XH11 CO
*** APPEARANCE PARTS ***		
	2X320331	CABINET,BACK
	2X320371	CABINET FRONT ASSY
	2X429391	REVOLVING STAND ASSY
	2X429431	LID(BACK)
	2X757641	LABEL(REV.)
*** KNOBS & PUSH BUTTONS ***		
	2X455941	PUSH BUTTON (SW)(B)
	2X457311	PUSH BUTTON(CONTROL)
*** PRINTED & PACKING MATERIALS ***		
	2X832891	SHEET,PROTECTION
	2X834191	CARTON BOX(CN618A)
	2X834451	FILLER(T),CARTON
	2X834461	FILLER(B),CARTON
	24813191	BAG,POLYETHYLENE(150*370)
MANUAL	78131921	USER'S MANUAL CN617/618 A
	2X785621	NAME PLATE, INSTRUCTION
	2X786291	NAME PLATE, INSTRUCTION

SYMBOL	PARTS NO	DESCRIPTION
R4E8 R978	40AA3187	R,CHIP 3.9K 5% 1/10W
R980	40AA3191	R,CHIP 5.6K 5% 1/10W
R772	40AA3193	R,CHIP 6.8K 5% 1/10W
R7A1 R7A2 R731 R751 R799 R959 R970 R982	40AA3197	R,CHIP 10K 5% 1/10W
R710 R961 R963	40AA3199	R,CHIP 12K 5% 1/10W
R987	40AA3207	R,CHIP 27K 5% 1/10W
R71P R968	40AA3221	R,CHIP 100K 5% 1/10W
R748B R748G R748R	40AA3223	R,CHIP 120K 5% 1/10W
R877	40AA3229	R,CHIP 220K 5% 1/10W
R747G R747R	40AA3231	R,CHIP 270K 5% 1/10W
R793	40AA3233	R,CHIP 330K 5% 1/10W
R783	40AA3245	R,CHIP 1.0M 5% 1/10W
R701B R701G R701R	40AB3146	R,CHIP 75H 1% 1/10W
R714	40AB3159	R,CHIP 270H 1% 1/10W
R984	40AB3169	R,CHIP 680H 1% 1/10W
R976	40AB3177	R,CHIP 1.5K 1% 1/10W
R715	40AB3182	R,CHIP 2.4K 1% 1/10W
R973	40AB3193	R,CHIP 6.8K 1% 1/10W
R74EG R74ER	40AB3212	R,CHIP 43K 1% 1/10W
R74EB	40AB3213	R,CHIP 47K 1% 1/10W
R618	401C6625	R,CARBON 10H 5% 1/4W
R680	401C6639	R,CARBON 39H 5% 1/4W
R5G3	401C6657	R,CARBON 220H 5% 1/4W
R781	401C6659	R,CARBON 270H 5% 1/4W
R907	401C6673	R,CARBON 1.0K 5% 1/4W
R992	401C6693	R,CARBON 6.8K 5% 1/4W
R749B R749G R749R	401C6729	R,CARBON 220K 5% 1/4W
⚠R2001 ⚠R529	401G6109	R,CARBON 2.2H 5% 1/4W
⚠R997	401G6133	R,CARBON 22H 5% 1/4W
⚠R985 ⚠R986	401G6141	R,CARBON 47H 5% 1/4W
⚠R5F2	401G6197	R,CARBON 10K 5% 1/4W
R411	401H5601	R,CARBON 1.0H 5% 1/2W
R553	401H5633	R,CARBON 22H 5% 1/2W
⚠R998	401H5673	R,CARBON 1.0K 5% 1/2W
R901 R902 R903	401H6637	R,CARBON 33H 5% 1/2W
R624	401H6643	R,CARBON 56H 5% 1/2W
R905	401H6649	R,CARBON 100H 5% 1/2W
R501	401H6663	R,CARBON 390H 5% 1/2W
R409	401H6665	R,CARBON 470H 5% 1/2W
R671	401H6669	R,CARBON 680H 5% 1/2W
R633	401H6679	R,CARBON 1.8K 5% 1/2W
R594	401H6697	R,CARBON 10K 5% 1/2W
⚠R5F3	401H6725	R,CARBON 150K 5% 1/2W
⚠R995 ⚠R996	401H6733	R,CARBON 330K 5% 1/2W
⚠R601	401H6737	R,CARBON 470K 5% 1/2W
R646	401H6739	R,CARBON 560K 5% 1/2W

SYMBOL			PARTS NO	DESCRIPTION
R5G4	R552	R638	401K5625	R,CARBON 10H 5% 1/6W
R619	R620		401K5633	R,CARBON 22H 5% 1/6W
R991			401K5639	R,CARBON 39H 5% 1/6W
R80J	R80L	R808	401K5641	R,CARBON 47H 5% 1/6W
R5E3	R5H7	R502	401K5649	R,CARBON 100H 5% 1/6W
R503	R511	R521		
R525	⚠R576	⚠R577		
⚠R578	⚠R579	R595		
R635	R639	R702B		
R702G	R702R	R794		
R795	R80A	R80C		
R80X	R804	R805		
R101	R977		401K5653	R,CARBON 150H 5% 1/6W
R809			401K5661	R,CARBON 330H 5% 1/6W
R528			401K5667	R,CARBON 560H 5% 1/6W
R657	R658		401K5669	R,CARBON 680H 5% 1/6W
R103	R105	R404	401K5671	R,CARBON 820H 5% 1/6W
R102	R104	R5E2	401K5673	R,CARBON 1.0K 5% 1/6W
R5G1	R531	R634		
R636	R645	R732		
R733	R734	R801		
R802	R979	R981		
R524	R536	R641	401K5677	R,CARBON 1.5K 5% 1/6W
R672	R823	R962		
R964				
R597	R743	R80E	401K5679	R,CARBON 1.8K 5% 1/6W
R80F				
R596	R656		401K5681	R,CARBON 2.2K 5% 1/6W
R677	R678	R80G	401K5683	R,CARBON 2.7K 5% 1/6W
R82A				
R522	R59F	R59L	401K5685	R,CARBON 3.3K 5% 1/6W
R643	R745			
R4E5	R59G		401K5687	R,CARBON 3.9K 5% 1/6W
R71E	R719	R744	401K5689	R,CARBON 4.7K 5% 1/6W
R821	R822			
⚠R2008	R5H9	R533	401K5691	R,CARBON 5.6K 5% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
⚠R5F1			40372101	R,METAL 1.0H 5% 2W
R583			40372127	R,METAL 12H 5% 2W
R994			40372149	R,METAL 100H 5% 2W
R571			40372153	R,METAL 150H 5% 2W
R653	R654		40372199	R,METAL 12K 5% 2W
R603			40372203	R,METAL 18K 5% 2W
R605			40373221	R,METAL 100K 5% 3W
R607			40373329	R,METAL 0.22H 5% 3W
R555			40373333	R,METAL 0.33H 5% 3W
⚠R561			40383502	R,METAL 1.2H 10% 3W
R523			404C1670	R,METAL 750H 1% 1/6W
R989			404C1673	R,METAL 1.0K 1% 1/6W
⚠R2003	R975		404C1681	R,METAL 2.2K 1% 1/6W
R408	R640		404C1687	R,METAL 3.9K 1% 1/6W
⚠R2004			404C1691	R,METAL 5.6K 1% 1/6W
R593			404C1695	R,METAL 8.2K 1% 1/6W
R407			404C1699	R,METAL 12K 1% 1/6W
⚠R2002			404C1702	R,METAL 16K 1% 1/6W
R405	R406	R59C	404C1706	R,METAL 24K 1% 1/6W
R592			404C1709	R,METAL 33K 1% 1/6W
R59A			404C1715	R,METAL 56K 1% 1/6W
R534			404C1720	R,METAL 91K 1% 1/6W
⚠R5U3			404C1721	R,METAL 100K 1% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R5H5	R637		401K5693	R,CARBON 6.8K 5% 1/6W
R742	R829		401K5695	R,CARBON 8.2K 5% 1/6W
R5G5	R5H3	R5H4	401K5697	R,CARBON 10K 5% 1/6W
R52A	R52C	R52E		
R532	R535	R537		
R57G	R57H	R57J		
R57K	R57L	R57M		
R57N	R57P	R59K		
R627	R642	R647		
R648	R771	R80H		
R80K	R80M	R80N		
R80P	R80R	R80T		
R80U	R80W	R815		
R876	R966			
⚠R2007	R80Y		401K5701	R,CARBON 15K 5% 1/6W
R630	R74JB	R74JG	401K5703	R,CARBON 18K 5% 1/6W
R74JR				
R803			401K5705	R,CARBON 22K 5% 1/6W
⚠R2006			401K5707	R,CARBON 27K 5% 1/6W
R875			401K5709	R,CARBON 33K 5% 1/6W
⚠R2005	R59J		401K5711	R,CARBON 39K 5% 1/6W
R806			401K5713	R,CARBON 47K 5% 1/6W
R514	R632	R824	401K5715	R,CARBON 56K 5% 1/6W
R825	R826	R827		
R828				
R784			401K5717	R,CARBON 68K 5% 1/6W
R57A	⚠R57C	⚠R57E	401K5721	R,CARBON 100K 5% 1/6W
R57F	R608	R629		
R967				
R5H1	R5H6	R59H	401K5733	R,CARBON 330K 5% 1/6W
⚠R572	⚠R573	⚠R574	401K5743	R,CARBON 820K 5% 1/6W
⚠R575				
R4E7	R762		401K5745	R,CARBON 1.0M 5% 1/6W
R554			40216224	R,WIRE 0.75H 5% 5W
R410			40371101	R,METAL 1.0H 5% 1W
R7F1			40371109	R,METAL 2.2H 5% 1W
R7F2			40371143	R,METAL 56H 5% 1W
R5F3			40371147	R,METAL 82H 5% 1W
R5E1			40371161	R,METAL 330H 5% 1W
R988			40371219	R,METAL 82K 5% 1W
R651			40371221	R,METAL 100K 5% 1W

SYMBOL			PARTS NO	DESCRIPTION
⚠R5U1			404C1722	R,METAL 110K 1% 1/6W
⚠R5T1			404C1726	R,METAL 160K 1% 1/6W
R59E			404C1733	R,METAL 330K 1% 1/6W
R591			404C1743	R,METAL 820K 1% 1/6W
⚠R990			404K5125	R,METAL 10H 5% 1/4W
R562			404K5133	R,METAL 22H 5% 1/4W
R556			40406109	R,METAL 2.2H 1/2W 5%
R983			40499449	R,METAL 10K 2% 1W
R659	R661	R662	40499507	R,METAL 0.22H 5% 1/2W

*** CAPACITORS ***

C723B	C723G	C723R	42AA1514	C,CHIP CERAMIC 50V 2700PF
C76L	C782	C982	42AA2726	C,CERAMIC 50V 0.01UF
C712	C714	C715B	42AA2744	C,CERAMIC 25V 0.1UF
C715G	C715R	C716		
C751	C752	C76A		
C76E	C76W	C763B		
C763G	C763R	C765B		
C765G	C765R	C766B		
C766G	C766R	C906		
C907	C962	C964		
C975				
C793	C794		42CA1428	C,CERAMIC 50V 33PF
C871	C909	C971	42CA1440	C,CERAMIC 50V 100PF
C976	C977			
C966			42CA1462	C,CERAMIC 50V 820PF
C874			42CA1464	C,CERAMIC 50V 1000PF
C591	C901		420C9551	C,CERAMIC 500V 100PF
⚠C5R1	C902	C992	420C9563	C,CERAMIC 500V 1000PF
C993				
C571	C76Y		420C9567	C,CERAMIC 500V 2200PF
C769			420C9569	C,CERAMIC 500V 3300PF
C551			420C9571	C,CERAMIC 500V 4700PF
C904	C905		420D0019	C,CERAMIC 2KV 1000PF
⚠C602	⚠C603		420FK171	C,CERAMIC 250V 4700PF
C811			420JJ088	C,CERAMIC 2K 220PF
⚠C607			42060287	C,CERAMIC 250V 2200PF
C403	C405		421A0425	C,CERAMIC 50V 0.01UF
C533			421C0213	C,CERAMIC 50V 1000PF
C592			421C0220	C,CERAMIC 50V 3900PF
C408	C5H6	⚠C5U1	421D6009	C,CERAMIC 25V 0.1UF

SYMBOL	PARTS NO	DESCRIPTION
C501 C503 C505 C525 ⚠C57A ⚠C577 ⚠C578 ⚠C579 C596 C804 C808	421D6009	C,CERAMIC 25V 0.1UF
⚠C5E2	421D6013	C,CERAMIC 50V 0.1UF
C801 C802	423A2015	C,CERAMIC 50V 10PF
C989	423E2111	C,CERAMIC 500V 10PF
C629 C631	427F4601	C,FILM 50V 1000PF
C594	427F4602	C,FILM 50V 1200PF
C409	427F4605	C,FILM 50V 2200PF
C521 C526	427F4611	C,FILM 50V 6800PF
C625 C632 C792 C974	427F4613	C,FILM 50V 0.01UF
C636	427F4615	C,FILM 50V 0.015UF
C593	427F4616	C,FILM 50V 0.018UF
C630	427F4617	C,FILM 50V 0.022UF
C791	427F4621	C,FILM 50V 0.047UF
C624 C626 C628 C633	427F4625	C,FILM 50V 0.1UF
C522	427F4651	C,FILM 50V 1000PF
C4E5	427F7049	C,FILM 50V 0.047UF
⚠C562	42799142	C,FILM 630V 6700
C511	428B3007	C,METAL FILM 50V 0.033UF
C407	428B3021	C,METAL FILM 50V 0.47UF
C534	428B3022	C,METAL FILM 50V 0.56UF
C5H3	428B3025	C,METAL FILM 50V 1.0UF
C512	428B3619	C,METAL 50V 0.33UF
C742B C742G C742R	428D0093	C,METALFILM 250V 0.1UF
C5G2	428JH006	C,METAL 250V 8200PF
C610	428J8007	C,METAL 400V 0.1UF
⚠C572	42816358	C,FILM 250V 0.33UF 5%
⚠C573 ⚠C574	42816505	C,METAL 200V 0.15UF
⚠C575	42816514	C,METAL 200V 0.36UF
⚠C576	42816523	C,METAL 200V 0.82UF
⚠C563	42816534	C,METAL 200V 2.4UF
⚠C561	42818501	C,FILM 1500V 4300P
⚠C601 ⚠C604	42826201	C,FILM 250V 0.1UF
C722B C722G C722R	42844417	C,METAL FILM 250V 0.22UF
⚠C5T1	430A4031	C,ELEC 16V 10UF
⚠C2003 C581	430B6017	C,ELEC 10V 220UF

SYMBOL	PARTS NO	DESCRIPTION
C811 C978 C984 C986	430B6029	C,ELEC 16V 100UF
C76J C80A	430B6030	C,ELEC 16V 220UF
C812	430B6032	C,ELEC 16V 470UF
C5G4 C76N C781	430B6041	C,ELEC 25V 47UF
C961 C963 C987	430B6042	C,ELEC 25V 100UF
C402 C406	430B6044	C,ELEC 25V 330UF
C4E4 C531 C80C C973	430B6061	C,ELEC 50V 1.0UF
C523 C872 C873	430B6062	C,ELEC 50V 2.2UF
C771	430B6064	C,ELEC 50V 4.7UF
⚠C2001 C5H4 C524 C701B C701G C701R C76G C76P C875	430B6065	C,ELEC 50V 10UF
C4E3	430B6094	C,ELEC 100V 1.0UF
C783	430B6097	C,ELEC 100V 4.7UF
C988	430B6515	C,ELEC 160V 4.7UF
C76M C767	430B6556	C,ELEC 250V 10UF
C667	430B9019	C,ELEC 10V 470UF
C7G2	430B9029	C,ELEC 16V 100UF
C76K C762 C764	430B9030	C,ELEC 16V 220UF
C504 C663	430B9033	C,ELEC 16V 1000UF
⚠C5F1 C612 C7G1 C718R	430B9041	C,ELEC 25V 47UF
C627	430B9042	C,ELEC 25V 100UF
C552	430B9045	C,ELEC 25V 470UF
C634 C713B C713G C713R	430B9062	C,ELEC 50V 2.2UF
C404	430B9070	C,ELEC 50V 220UF
C991	430B9085	C,ELEC 63V 47UF
C768	430B9099	C,ELEC 100V 22UF
C5H1	430B9551	C,ELEC 250V 0.47UF
C506	430C0047	C,ELEC 16V 47UF
C502 C805 C968	430C0054	C,ELEC 25V 10UF
C665	4302J046	C,ELEC 25V 1000UF
C660	4302J047	C,ELEC 25V 2200UF
C657	4302J102	C,ELEC 100V 100UF
C653	4302J560	C,ELEC 250V 100UF
C5G1	4303H358	C,ELEC 250V 47UF

SYMBOL	PARTS NO	DESCRIPTION
C5G3	4309J171	C,ELEC 200V 33UF
⚠C609	43113102	C,ELEC 200V 330UF M
C532 C981	433A4055	C,ELEC 50V 1.0UF
C582	433A7014	C,ELEC 16V 100UF

REPLACEMENT PARTS LIST

The components specified for Model JC-1736VMB

Note: The components identified by ⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33017581	CRT M41LHA128X401(F4)
*** ICS ***		
IC811	37005277	IC PQ05RR13 (REG)
IC7G1	37005297	IC PQ12RD11
IC401	37006025	IC LA7840
IC501	37009037	IC UPC1885CT
IC5H1 IC591	37011350	IC KIA358P (OP-AMP)
IC961	37011362	IC M52723SP-700
IC621	37011366	IC KIA3842P
IC803	37055537	MOS NM24C04EN
IC751	37076176	MOS M62393P
IC671	37076357	IC SE080N(LF12)
IC791	37076360	MOS LSC4343P
IC711	37076367	IC M52737SP
IC721	37076368	IC LM2405T
IC801	37076373	MOS HD6433214WA04P
*** TRANSISTORS ***		
Q742 Q771 Q871	35AB0011	TR 2SA812-T1B M5
Q4E3 Q714 Q772	35CB0011	TR 2SC1623-T1B L5
Q773 Q873 Q962 Q963		
Q712B Q712G Q712R Q791	35CB2410	TR 2SC3082K-T146
Q4E4	35EB0230	TR DTC114EKA-T146
Q872	35EB0232	TR DTC144EKA-T146(0°)
⚠Q5F1 Q743B Q743G Q743R	350A1500	TR 2SA1767-TA
Q983	350A2001	TR 2SA1038S-TP R
Q630	350D7216	TR 2SC945-T P
⚠Q2003 Q5E1 Q5G2	350D7217	TR 2SC945-T Q
Q521 Q523 Q531		
Q628 Q631 Q632		
Q671		
Q986	350E3218	TR 2SC1740S-T R
Q581 Q7F1	350G1017	TR 2SD2005-T105 Q
Q781	350H4418	TR,2SC1473-TA R
Q821	350H5017	TR,2SC3811-TA Q

SYMBOL	PARTS NO	DESCRIPTION
⚠D2002 D2003 D2004 D4E1 D4E3 D4E4 D4E6 D5E1 D5E2 D5G1 D5G2 D5H4 D521 D522 D523 D524 D525 D526 D627 D630 D631 D632 D658 D701B D701G D701R D702B D702G D702R D71E D71F D771 D781 D782 D874 D875 D961 D967 D968 D981 D982 D983 D984	360K1025	DIODE 1SS133
ZD601	360K3129	DIODE,RD27EB(4)-T4
ZD531	360K3630	DIODE RD4.7ESB(1)-T4
ZD982	360K3639	DIODE RD5.6ESB(2)-T4
ZD7F1	360K3648	DIODE RD6.8ESB(3)/ESAB(3)
⚠ZD2001	360K3652	DIODE RD7.5ESB(3)-T4
⚠ZD2002	360K3675	DIODE RD13ESB(2)-T4
⚠ZD2003	360K3699	DIODE RD24ES AB1-T4
ZD628	360K3702	DIODE RD24ESB(4)-T4
D602	361K7174	DIODE RU1P V1

SYMBOL	PARTS NO	DESCRIPTION
Q744B Q744G Q744R Q982	350J5205 350J5241	TR 2SC3415S-TP TR 2SC2389S-TP R
Q987	350J5263	TR 2SC4620 Q-TV2
Q101 Q102 ⚠Q2002 Q5G3 Q522 Q592 Q827 Q633	350K3517	TR 2SA733/2SA733A-T Q
Q992	35029992	TR 2SB1569A E
Q591	35072710	TR 2SD1897
Q991	35072732	TR 2SD2400A E
⚠Q561	35095210	TR 2SC5299
Q981	35095382	TR 2SC3478A K
⚠Q2001	351G0570	TR DTA144ESA-T
Q5H1 Q525 Q526 Q527 Q575 Q576 Q577 Q578	351G0577	TR DTC144ESA-T
Q524 Q801 Q961	351G0580	TR DTC114ESA-T
Q5G1	35127470	TR 2SJ306
Q553	35127630	TR 2SK1904
⚠Q571 ⚠Q572	35127920	TR 2SK2520-01MR
⚠Q601	35128010	TR 2SK2651-01MR(F111)
⚠Q573 ⚠Q574	35128012	TR FS10KMJ-2
Q103 Q104	355D2715	TR BA1A4M
*** DIODES ***		
ZD5E1 ZD7A1 ZD7A2 ZD8A1 ZD8A2	360A0038 360A0043	DIODE MTZJ5.6A T-72 DIODE MTZJ6.2B T-72
ZD741	360A0046	DIODE MTZJ6.8A T-72

SYMBOL	PARTS NO	DESCRIPTION
D621 D622	361K7523	DIODE ERA15-04V1
⚠D2001	361K7562	DIODE EGP10G G23
D603 D629 D656	361K7723	DIODE UF4003 G23
D572 D573 D574 D575	361K7754	DI 1SR139-600 T31
D724B D724G D724R D725B D725G D725R D742B D742G D742R D762	361K7777	DIODE 1SS244-T72
D871 D872 D873	361K8252	DI RB721Q-40T72
D551	36107293	DIODE RK14
D5G3 D552	36107518	DIODE RG2
⚠D561	36107750	DIODE ESC023M-15
⚠D562	36107764	DIODE ERD09-15J9
⚠D601	36107783	DIODE KBL405G-FA1
D651	36107784	DIODE ERC38-06L
D652	36107785	DIODE ERC38-04L
D653	36107786	DIODE ERC91-02L
D654 D655	36107787	DIODE ERB93-02E
LED101	36801021	LED SML19416W-LF38
LED601	36801397	LED SEL1915CAM-LF58(C,D)
D401 D5H1 D571	369K2136	DIODE RGP10G,AT
D71H D741	380K5054	VARISTOR MA29W-A (TP)
⚠TH602	38102075	THERMISTOR SCK-103L
⚠TH603	38112058	THERMISTOR,POSITIVE
⚠PC601 ⚠PC602 ⚠PC603	38200354	PHOTOCOUPLER PC123FY2
*** TRANSFORMERS ***		
⚠T551	45804027	TRANS,H.DRAIVE (W509B)
T991	45950003	D.F.TRANS
L5G2	46206020	CHOKE COIL 3MH (EI28)
⚠T601	46309608	SWITCHING TRANS
⚠T5R1	47105722	FBT
*** VARIABLE RESISTORS ***		
VR961 VR962	410G1313	R,VARIABLE B10K
VR581	410G1407	R,VARIABLE B1K
VR743	410G2156	R,VARIABLE B2K
⚠VR5T1	415K5162	R,VARIABLE 100K

SYMBOL	PARTS NO	DESCRIPTION
*** RELAYS & SWITCHES ***		
SW581	65161081	SWITCH SLIDE 00220867
SW101 SW102 SW104 SW105 SW106	653F0067	TACT SWITCH PCO 05K
SW103	65360047	TACT SWITCH KSM0642A
⚠SW601	65360071	PUSH SWITCH ESB92S218
⚠RL601	65660047	RELAY RPEF-12
*** COILS & FILTERS ***		
LC7A1 LC7A2 LC701B LC701G LC701R LC761	390J9027	FILTER ZJSC-R12-100TA
⚠L562	60906071	COIL,WIDTH 90UH
⚠L571	60919165	COIL,H.LIN 22.5T
L602	610E1729	COIL,FILTER 100UH
L723B L723G L723R	610E4029	COIL,FILTER 0.39UH
⚠L561	610F3014	COIL,FILTER 3.3UH
L5G1	610F3025	COIL,FILTER 47UH
L901	610F7018	COIL,FILTER 12UH
L501 L502 L962	610F7022	COIL,FILTER 27UH
L762	610F7518	COIL,FILTER 12UH
L761 L763	610F7525	COIL,FILTER 47UH
L654 L655	610G0320	CHOKECOIL TSL0809RA-330K1
L653	610G0333	CHOKECOIL TSL1112RA-330K2
L601 L657 L658 L659 L660 L661 L662	610J9021	COIL BEADS (ZBF503D-00TA)
L551	610J9125	COIL,FILTER 220K LHL10TB
⚠L5R1	610J9130	FILTER COIL SPT0406A100K
⚠FL602	61062237	COIL,FILTER (96189-A)1MH
⚠FL601	61062238	COIL,FILTER(96190-A)4.5MH
L581	61070322	COIL,CHOKE 4MH
X501	61111015	CERAMIC OSC CSB500F2
⚠DEG	61317210	DEGAUSSING COIL (17.2H 90
L721B L721G L721R	616J9019	FERAITE BEADS HF55BTL
LC762	616K6027	NOISE FILTER 2A222-TA
LC744 LC766	616K6028	NOISE FILTER 1H223X-TA
D5G3	61605135	FERRITE CORE

SYMBOL	PARTS NO	DESCRIPTION
*** RESISTORS ***		
J751 J752 J753	40AAD100	R,CHIP 0.0H 5% 1/2W
R761	40AAD149	R,CHIP 100H 5% 1/2W
J4E2 J7A1 J7A2 J7A8 J7E2 J7E3 R74AG	40AA1000	R,CHIP 0H 5% 1/8W
R713 R752 R753	40AA1149	R,CHIP 100H 5% 1/8W
R717B R717G R717R	40AA1153	R,CHIP 150H 5% 1/8W
R716B R716G R716R R774	40AA1163	R,CHIP 390H 5% 1/8W
R718B R718G R718R	40AA1165	R,CHIP 470H 5% 1/8W
R773 R878	40AA1173	R,CHIP 1.0K 5% 1/8W
R4E1	40AA1177	R,CHIP 1.5K 5% 1/8W
R4EE	40AA1187	R,CHIP 3.9K 5% 1/8W
R4EH	40AA1197	R,CHIP 10K 5% 1/8W
R782	40AA1199	R,CHIP 12K 5% 1/8W
R74CB R74CG R74CR	40AA1210	R,CHIP 36K 5% 1/8W
R747B	40AA1231	R,CHIP 270K 5% 1/8W
R873 R874	40AA1253	R,CHIP 2.2M 5% 1/8W
R906	40AA2221	R,CHIP 100K 5% 1/4W
J4E1 J7A5 J7E1 J7E4 R71V R723B R723G R723R R74AB R74AR R755B R755G R755R R776 R972	40AA3000	R,CHIP 0.0H 5% 1/10W
R582 R754	40AA3125	R,CHIP 10H 5% 1/10W
R974	40AA3141	R,CHIP 47H 5% 1/10W
R581 R712 R721B R721G R721R R722B R722G R722R R726B R726G R726R R74FB R74FG R74FR R965	40AA3149	R,CHIP 100H 5% 1/10W
R871 R872	40AA3161	R,CHIP 330H 5% 1/10W
R775	40AA3167	R,CHIP 560H 5% 1/10W
R71A R728G R728R R790 R796 R969	40AA3173	R,CHIP 1.0K 5% 1/10W
R74KG R797	40AA3177	R,CHIP 1.5K 5% 1/10W
R728B	40AA3179	R,CHIP 1.8K 5% 1/10W
R711 R792	40AA3181	R,CHIP 2.2K 5% 1/10W
R791	40AA3185	R,CHIP 3.3K 5% 1/10W
R4E8 R978	40AA3187	R,CHIP 3.9K 5% 1/10W
R980	40AA3191	R,CHIP 5.6K 5% 1/10W
R772	40AA3193	R,CHIP 6.8K 5% 1/10W

SYMBOL	PARTS NO	DESCRIPTION
*** PWB ASSYS ***		
	84R96J01	CRT PWB ASSY
	84R97F01	MAIN PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
SG901 SG902 SG903 SG904	329JK047	ARRESTER
SG901 SG902 SG903 SG904	329J0047	ARRESTER (300V),AT52
CN-GND	32990205	INSULATING CAP TIC-3.5(
X801	64099224	X'TAL OSC AT-49(16MHZ)
⚠F601	66699064	FUSE UL(ET) 250V 4A
SG905 ⚠SG991	667K6007	SPARK GAP 1.5KV
⚠CNCRT	70032064	CRT SOCKET HPS3200-010520
⚠IN601	70521069	INLET SK-1019(DELTA)
CORD	70800087	POWER CORD E-2 L!.8 GRY
CABLE	73893244	SIGNAL CABLE MDI5-XH11 CO
*** APPEARANCE PARTS ***		
	2X320621	CABINET FRONT ASSY
	2X320641	CABINET BACK
	2X429431	LID(BACK)
	2X429441	REVOLVING STAND ASSY
*** KNOBS & PUSH BUTTONS ***		
	2X455941	PUSH BUTTON (SW)(B)
	2X457311	PUSH BUTTON(CONTROL)
*** PRINTED & PACKING MATERIALS ***		
	2X832891	SHEET, PROTECTION
	2X834201	CARTON BOX (CN618B)
	2X834451	FILLER (T), CARTON
	2X834461	FILLER (B), CARTON
	24813191	BAG, POLYETHYLENE (150*370)
MANUAL	78131951	USER'S MANUAL CN617/618B
	2X785661	NAME PLATE, INSTRUCTION
	2W785661	NAME PLATE, INSTRUCTION

SYMBOL	PARTS NO	DESCRIPTION
R7A1 R7A2 R731 R751 R799 R959 R970 R982	40AA3197	R,CHIP 10K 5% 1/10W
R710 R961 R963 R987	40AA3199 40AA3207	R,CHIP 12K 5% 1/10W R,CHIP 27K 5% 1/10W
R71P R968 R748B R748G R748R	40AA3221 40AA3223	R,CHIP 100K 5% 1/10W R,CHIP 120K 5% 1/10W
R877 R747G R747R R793 R783 R701B R701G R701R	40AA3229 40AA3231 40AA3233 40AA3245 40AB3146	R,CHIP 220K 5% 1/10W R,CHIP 270K 5% 1/10W R,CHIP 330K 5% 1/10W R,CHIP 1.0M 5% 1/10W R,CHIP 75H 1% 1/10W
R714 R984 R976 R715 R973	40AB3159 40AB3169 40AB3177 40AB3182 40AB3193	R,CHIP 270H 1% 1/10W R,CHIP 680H 1% 1/10W R,CHIP 1.5K 1% 1/10W R,CHIP 2.4K 1% 1/10W R,CHIP 6.8K 1% 1/10W
R74EG R74ER R74EB R618	40AB3212 40AB3213 401C6625	R,CHIP 43K 1% 1/10W R,CHIP 47K 1% 1/10W R,CARBON 10H 5% 1/4W
R680 R5G3 R781 R907 R992	401C6639 401C6657 401C6659 401C6673 401C6693	R,CARBON 39H 5% 1/4W R,CARBON 220H 5% 1/4W R,CARBON 270H 5% 1/4W R,CARBON 1.0K 5% 1/4W R,CARBON 6.8K 5% 1/4W
R749B R749G R749R ⚠R2001 ⚠R529 ⚠R997 ⚠R985 ⚠R986 ⚠R5F2	401C6729 401G6109 401G6133 401G6141 401G6197	R,CARBON 220K 5% 1/4W R,CARBON 2.2H 5% 1/4W R,CARBON 22H 5% 1/4W R,CARBON 47H 5% 1/4W R,CARBON 10K 5% 1/4W
R411 R553	401H5601 401H5633	R,CARBON 1.0H 5% 1/2W R,CARBON 22H 5% 1/2W
⚠R998 R901 R902 R903	401H5673 401H6537	R,CARBON 1.0K 5% 1/2W R,CARBON 33H 5% 1/2W

SYMBOL	PARTS NO	DESCRIPTION
R624	401H6643	R,CARBON 56H 5% 1/2W
R905	401H6649	R,CARBON 100H 5% 1/2W
R501	401H6663	R,CARBON 390H 5% 1/2W
R409	401H6665	R,CARBON 470H 5% 1/2W
R671	401H6669	R,CARBON 680H 5% 1/2W
R633	401H6679	R,CARBON 1.8K 5% 1/2W
R594	401H6697	R,CARBON 10K 5% 1/2W
⚠R5F3	401H6725	R,CARBON 150K 5% 1/2W
⚠R995 ⚠R996	401H6733	R,CARBON 330K 5% 1/2W
⚠R601	401H6737	R,CARBON 470K 5% 1/2W
R646	401H6739	R,CARBON 560K 5% 1/2W
R5G4 R552 R638	401K5625	R,CARBON 10H 5% 1/6W
R619 R620	401K5633	R,CARBON 22H 5% 1/6W
R991	401K5639	R,CARBON 39H 5% 1/6W

SYMBOL	PARTS NO	DESCRIPTION
R648 R771 R80H	401K5697	R,CARBON 10K 5% 1/6W
R80K R80M R80N		
R80P R80R R80T		
R80U R80W R815		
R876 R966		
⚠R2007 R80Y	401K5701	R,CARBON 15K 5% 1/6W
R630 R74JB R74JG	401K5703	R,CARBON 18K 5% 1/6W
R74JR		
R803	401K5705	R,CARBON 22K 5% 1/6W
⚠R2006	401K5707	R,CARBON 27K 5% 1/6W
R875	401K5709	R,CARBON 33K 5% 1/6W
⚠R2005 R59J	401K5711	R,CARBON 39K 5% 1/6W
R806	401K5713	R,CARBON 47K 5% 1/6W
R514 R632 R824	401K5715	R,CARBON 56K 5% 1/6W
R825 R826 R827		
R828		
R784	401K5717	R,CARBON 68K 5% 1/6W
⚠R57A ⚠R57C ⚠R57E	401K5721	R,CARBON 100K 5% 1/6W
⚠R57F R608 R629		
R967		
R5H1 R5H6 R59H	401K5733	R,CARBON 330K 5% 1/6W
⚠R572 ⚠R573 ⚠R574	401K5743	R,CARBON 820K 5% 1/6W
⚠R575		
R4E7 R762	401K5745	R,CARBON 1.0M 5% 1/6W
R554	40216224	R,WIRE 0.75H 5% 5W
R410	40371101	R,METAL 1.0H 5% 1W
R7F1	40371109	R,METAL 2.2H 5% 1W
R7F2	40371143	R,METAL 56H 5% 1W
⚠R5R1	40371147	R,METAL 82H 5% 1W
R5E1	40371161	R,METAL 330H 5% 1W
R988	40371219	R,METAL 82K 5% 1W
R651	40371221	R,METAL 100K 5% 1W
⚠R5F1	40372101	R,METAL 1.0H 5% 2W
R583	40372127	R,METAL 12H 5% 2W
R994	40372149	R,METAL 100H 5% 2W
R571	40372153	R,METAL 150H 5% 2W
R653 R654	40372199	R,METAL 12K 5% 2W
R603	40373211	R,METAL 39K 5% 3W
R605	40373221	R,METAL 100K 5% 3W
R607	40373329	R,METAL 0.22H 5% 3W

SYMBOL	PARTS NO	DESCRIPTION
R80J R80L R808	401K5641	R,CARBON 47H 5% 1/6W
R5E3 R5H7 R502	401K5649	R,CARBON 100H 5% 1/6W
R503 R511 R521		
R525 ⚠R576 ⚠R577		
⚠R578 ⚠R579 R595		
R635 R639 R702B		
R702G R702R R794		
R795 R80A R80C		
R80X R804 R805		
R101 R977	401K5653	R,CARBON 150H 5% 1/6W
R809	401K5661	R,CARBON 330H 5% 1/6W
R528	401K5667	R,CARBON 560H 5% 1/6W
R657 R658	401K5669	R,CARBON 680H 5% 1/6W
R103 R105 R404	401K5671	R,CARBON 820H 5% 1/6W
R102 R104 R5E2	401K5673	R,CARBON 1.0K 5% 1/6W
R5G1 R531 R634		
R636 R645 R732		
R733 R734 R801		
R802 R979 R981		
R524 R536 R641	401K5677	R,CARBON 1.5K 5% 1/6W
R672 R823 R962		
R964		
R597 R743 R80E	401K5679	R,CARBON 1.8K 5% 1/6W
R80F		
R596 R656	401K5681	R,CARBON 2.2K 5% 1/6W
R677 R678 R80G	401K5683	R,CARBON 2.7K 5% 1/6W
R82A		
R522 R59F R59L	401K5685	R,CARBON 3.3K 5% 1/6W
R643 R745		
R4E5 R59G	401K5687	R,CARBON 3.9K 5% 1/6W
R71E R719 R744	401K5689	R,CARBON 4.7K 5% 1/6W
R821 R822		
⚠R2008 R5H9 R533	401K5691	R,CARBON 5.6K 5% 1/6W
R5H5 R637	401K5693	R,CARBON 6.8K 5% 1/6W
R742 R829	401K5695	R,CARBON 8.2K 5% 1/6W
R5G5 R5H3 R5H4	401K5697	R,CARBON 10K 5% 1/6W
R52A R52C R52E		
R532 R535 R537		
R57G R57H R57J		
R57K R57L R57M		
R57N R57P R59K		
R627 R642 R647		

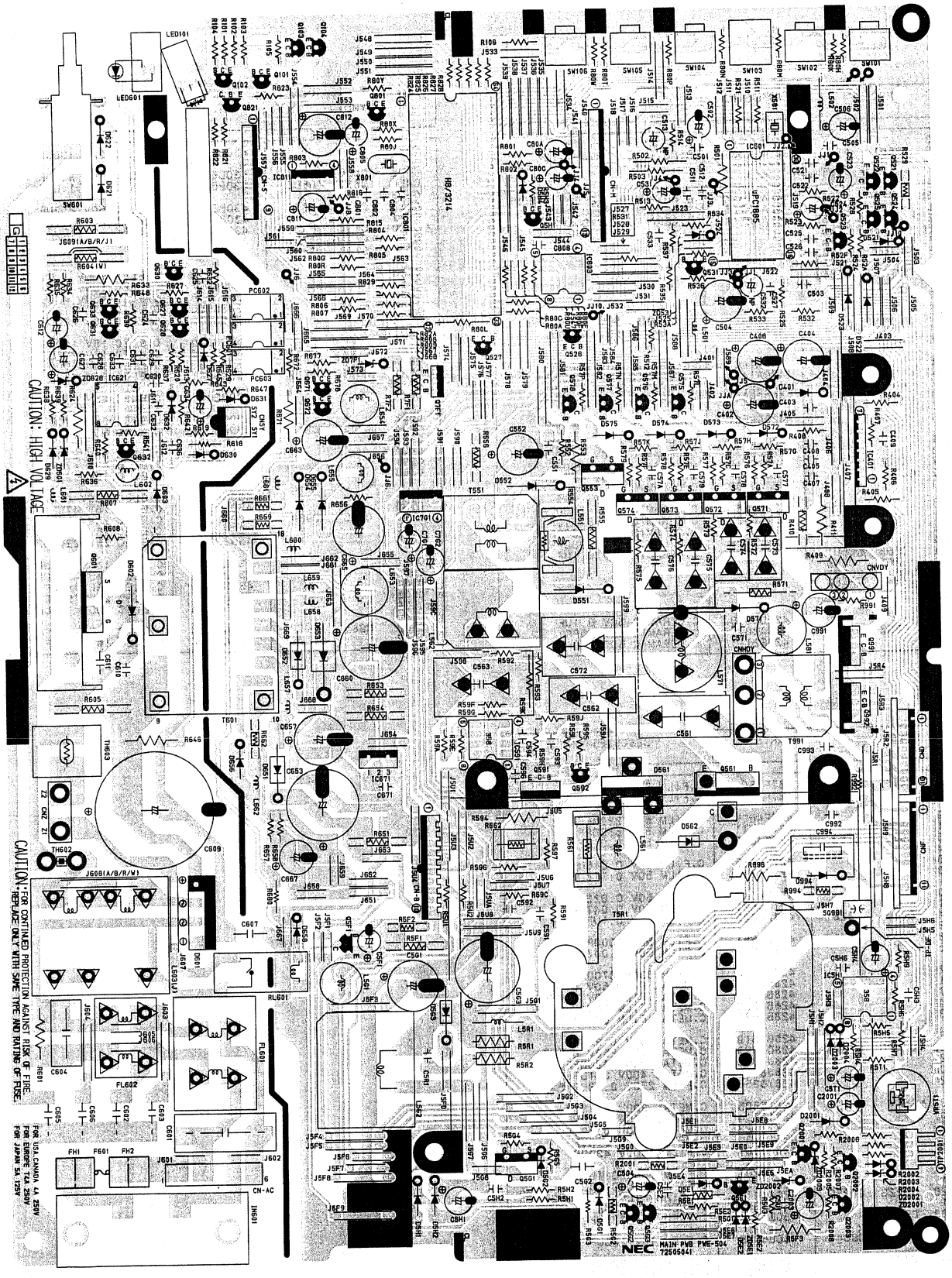
SYMBOL	PARTS NO	DESCRIPTION
R555	40373333	R,METAL 0.33H 5% 3W
⚠R561	40383502	R,METAL 1.2H 10% 3W
R523	404C1670	R,METAL 750H 1% 1/6W
R989	404C1673	R,METAL 1.0K 1% 1/6W
⚠R2003 R975	404C1681	R,METAL 2.2K 1% 1/6W
R408 R640	404C1687	R,METAL 3.9K 1% 1/6W
⚠R2004	404C1691	R,METAL 5.6K 1% 1/6W
R593	404C1695	R,METAL 8.2K 1% 1/6W
R407	404C1699	R,METAL 12K 1% 1/6W
⚠R2002	404C1702	R,METAL 16K 1% 1/6W
R405 R406 R59C	404C1706	R,METAL 24K 1% 1/6W
R592	404C1709	R,METAL 33K 1% 1/6W
R59A	404C1715	R,METAL 56K 1% 1/6W
R534	404C1720	R,METAL 91K 1% 1/6W
⚠R5U3	404C1721	R,METAL 100K 1% 1/6W
⚠R5U1	404C1722	R,METAL 110K 1% 1/6W
⚠R5T1	404C1726	R,METAL 160K 1% 1/6W
R59E	404C1733	R,METAL 330K 1% 1/6W
R591	404C1743	R,METAL 820K 1% 1/6W
⚠R990	404K5125	R,METAL 10H 5% 1/4W
R5G2	404K5133	R,METAL 22H 5% 1/4W
R556	40406109	R,METAL 2.2H 1/2W 5%

SYMBOL	PARTS NO	DESCRIPTION
R983	40499449	R,METAL 10K 2% 1W
R659 R661 R662	40499507	R,METAL 0.22H 5% 1/2W
*** CAPACITORS ***		
C723B C723G C723R	42AA1514	C,CHIP CERAMIC 50V 2700PF
C76L C782 C982	42AA2726	C,CERAMIC 50V 0.01UF
C712 C714 C715B	42AA2744	C,CERAMIC 25V 0.1UF
C715G C715R C716		
C751 C752 C76A		
C76E C76W C763B		
C763G C763R C765B		
C765G C765R C766B		
C766G C766R C906		
C907 C962 C964		
C975		
C793 C794	42CA1428	C,CERAMIC 50V 33PF
C871 C909 C971	42CA1440	C,CERAMIC 50V 100PF
C976 C977		
C966	42CA1462	C,CERAMIC 50V 820PF
C874	42CA1464	C,CERAMIC 50V 1000PF
C591 C901	420C9551	C,CERAMIC 500V 100PF
⚠C5R1 C902 C992	420C9563	C,CERAMIC 500V 1000PF
C993		
C571 C76Y	420C9567	C,CERAMIC 500V 2200PF
C769	420C9569	C,CERAMIC 500V 3300PF
C551	420C9571	C,CERAMIC 500V 4700PF
C904 C905	420D0019	C,CERAMIC 2KV 1000PF
⚠C602 ⚠C603	420FK171	C,CERAMIC 250V 4700PF
C611	420JJ088	C,CERAMIC 2K 220PF
⚠C607	42060287	C,CERAMIC 250V 2200PF
C403 C405	421A0425	C,CERAMIC 50V 0.01UF
C533	421C0213	C,CERAMIC 50V 1000PF
C592	421C0220	C,CERAMIC 50V 3900PF
C408 C5H6 ⚠C5U1	421D6009	C,CERAMIC 25V 0.1UF
C501 C503 C505		
C525 ⚠C57A ⚠C577		
⚠C578 ⚠C579 C596		
C804 C808		
⚠C5E2	421D6013	C,CERAMIC 50V 0.1UF
C801 C802	423A2015	C,CERAMIC 50V 10PF
C989	423E2111	C,CERAMIC 500V 10PF

SYMBOL	PARTS NO	DESCRIPTION
C987	430B6042	C,ELEC 25V 100UF
C402 C406	430B6044	C,ELEC 25V 330UF
C4E4 C531 C80C	430B6061	C,ELEC 50V 1.0UF
C973		
C523 C872 C873	430B6062	C,ELEC 50V 2.2UF
C771	430B6064	C,ELEC 50V 4.7UF
⚠C2001 C5H4 C524	430B6065	C,ELEC 50V 10UF
C701B C701G C701R		
C76G C76P C875		
C4E3	430B6094	C,ELEC 100V 1.0UF
C783	430B6097	C,ELEC 100V 4.7UF
C988	430B6515	C,ELEC 160V 4.7UF
C76M C767	430B6556	C,ELEC 250V 10UF
C667	430B9019	C,ELEC 10V 470UF
C7G2	430B9029	C,ELEC 16V 100UF
C76K C762 C764	430B9030	C,ELEC 16V 220UF
C504 C663	430B9033	C,ELEC 16V 1000UF
⚠C5F1 C612 C7G1	430B9041	C,ELEC 25V 47UF
C718R		
C627	430B9042	C,ELEC 25V 100UF
C552	430B9045	C,ELEC 25V 470UF
C634 C713B C713G	430B9062	C,ELEC 50V 2.2UF
C713R		
C404	430B9070	C,ELEC 50V 220UF
C991	430B9085	C,ELEC 63V 47UF
C768	430B9099	C,ELEC 100V 22UF
C5H1	430B9551	C,ELEC 250V 0.47UF
C506	430C0047	C,ELEC 16V 47UF
C502 C805 C968	430C0054	C,ELEC 25V 10UF
C665	4302J046	C,ELEC 25V 1000UF
C660	4302J047	C,ELEC 25V 2200UF
C657	4302J102	C,ELEC 100V 100UF
C653	4302J560	C,ELEC 250V 100UF
C5G1	4303H358	C,ELEC 250V 47UF
C5G3	4309J171	C,ELEC 200V 33UF
⚠C609	43113169	C,ELEC 400V 180UF M
C532 C981	433A4055	C,ELEC 50V 1.0UF
C582	433A7014	C,ELEC 16V 100UF

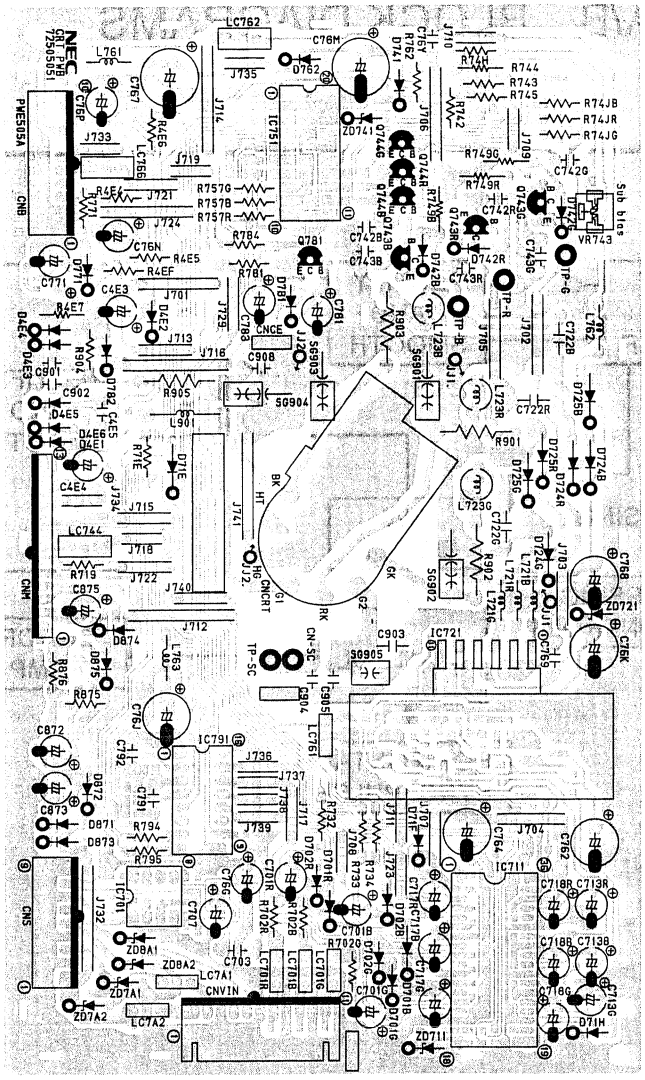
SYMBOL	PARTS NO	DESCRIPTION
C629 C631	427F4601	C,FILM 50V 1000PF
C594	427F4602	C,FILM 50V 1200PF
C409	427F4605	C,FILM 50V 2200PF
C521 C526	427F4611	C,FILM 50V 6800PF
C625 C632 C792	427F4613	C,FILM 50V 0.01UF
C974		
C636	427F4615	C,FILM 50V 0.015UF
C593	427F4616	C,FILM 50V 0.018UF
C630	427F4617	C,FILM 50V 0.022UF
C791	427F4621	C,FILM 50V 0.047UF
C624 C626 C628	427F4625	C,FILM 50V 0.1UF
C633		
C522	427F4651	C,FILM 50V 1000PF
C4E5	427F7049	C,FILM 50V 0.047UF
⚠C562	42799142	C,FILM 630V 6700
C511	428B3007	C,METAL FILM 50V 0.033UF
C407	428B3021	C,METAL FILM 50V 0.47UF
C534	428B3022	C,METAL FILM 50V 0.56UF
C5H3	428B3025	C,METAL FILM 50V 1.0UF
C512	428B3619	C,METAL 50V 0.33UF
C742B C742G C742R	428D0093	C,METALFILM 250V 0.1UF
C5G2	428JH006	C,METAL 250V 8200PF
C610	428J8007	C,METAL 400V 0.1UF
⚠C572	42816358	C,FILM 250V 0.33UF 5%
⚠C573 ⚠C574	42816505	C,METAL 200V 0.15UF
⚠C575	42816514	C,METAL 200V 0.36UF
⚠C576	42816523	C,METAL 200V 0.82UF
⚠C563	42816534	C,METAL 200V 2.4UF
⚠C561	42816501	C,FILM 1500V 4300P
⚠C604	42826201	C,FILM 250V 0.1UF
⚠C601	42826203	C,FILM 250V 0.33UF
C722B C722G C722R	42844417	C,METAL FILM 250V 0.22UF
⚠C5T1	430A4031	C,ELEC 16V 10UF
⚠C2003 C581	430B6017	C,ELEC 10V 220UF
C811 C978 C984	430B6029	C,ELEC 16V 100UF
C986		
C76J C80A	430B6030	C,ELEC 16V 220UF
C812	430B6032	C,ELEC 16V 470UF
C5G4 C76N C781	430B6041	C,ELEC 25V 47UF
C961 C963		

PRINTED WIRING BOARDS


CAUTION: HIGH VOLTAGE
CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.
FOR USA,CANADA 4A 250V
FOR EUROPE 5A 250V
FOR JAPAN 5A 125V
NEC
MAIN PWB PWE-504
72505041

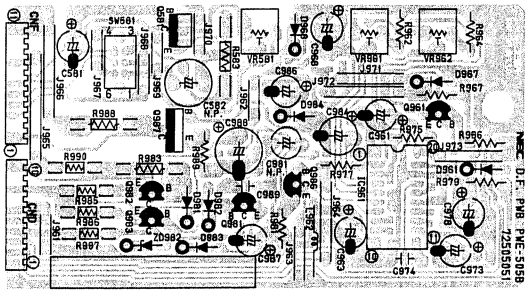
MAIN PWB (PWE-504)

— Solder Side —



CRT PWB (PWE-505A)

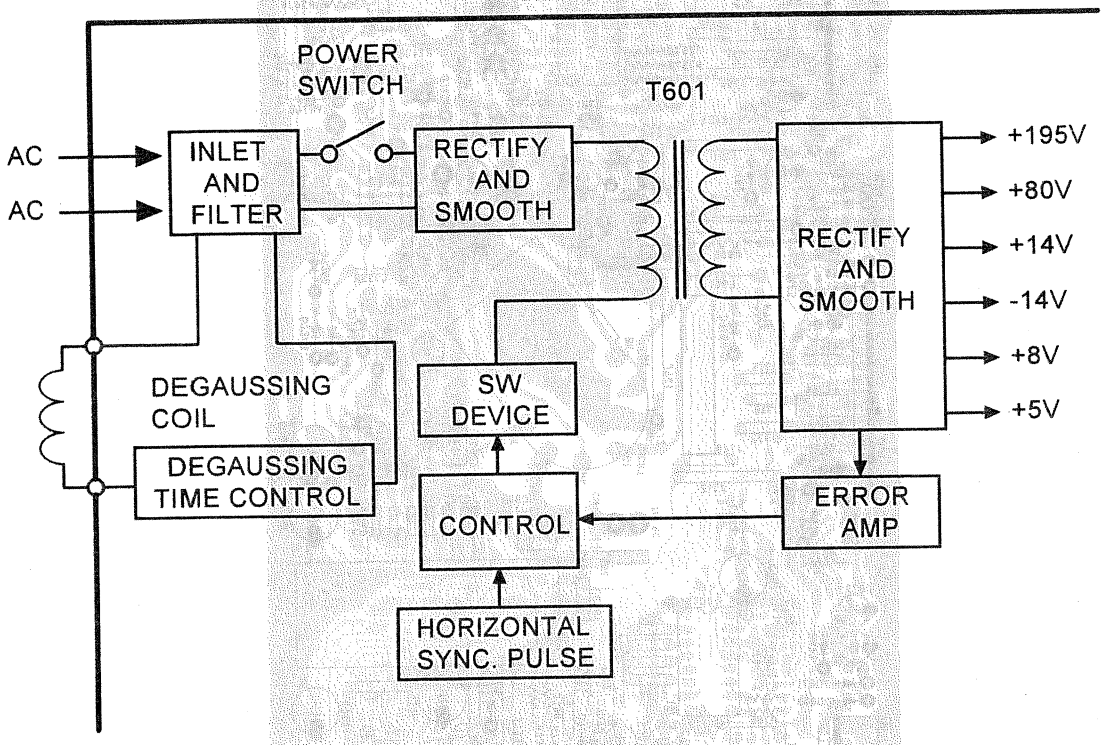
— Solder Side —

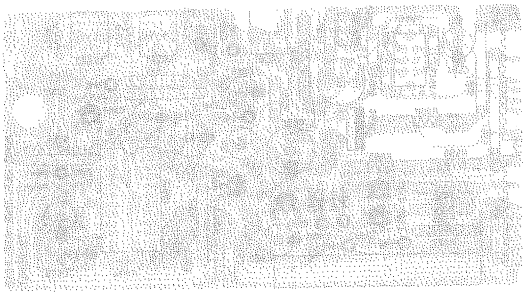


DF PWB (PWE-505B)

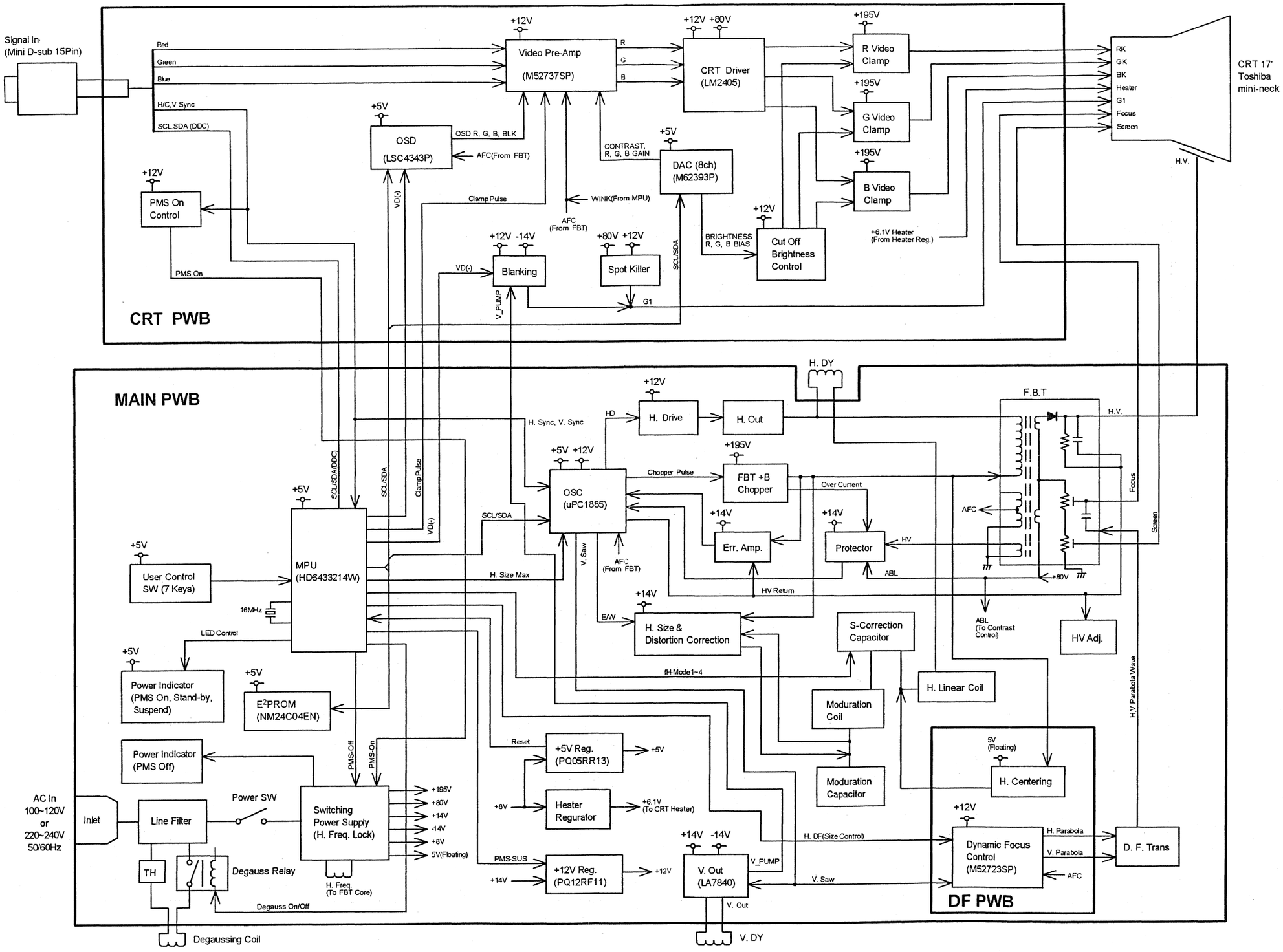
— Solder Side —

JC-1736VMA/B BLOCK DIAGRAMS



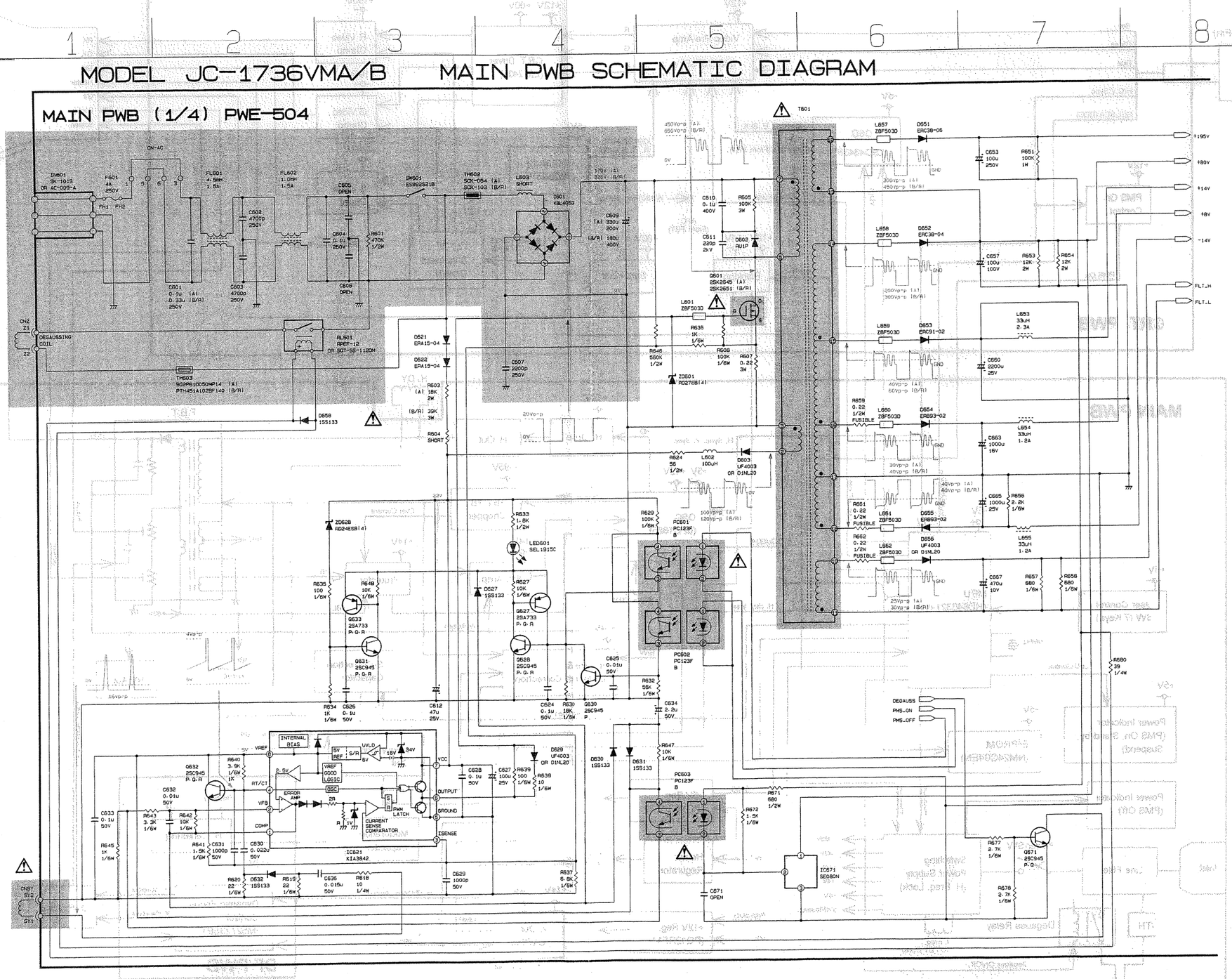


JC-1736VMA/B BLOCK DIAGRAMS



MODEL JC-1736VMA/B MAIN PWB SCHEMATIC DIAGRAM

MAIN PWB (1/4) PWE-504



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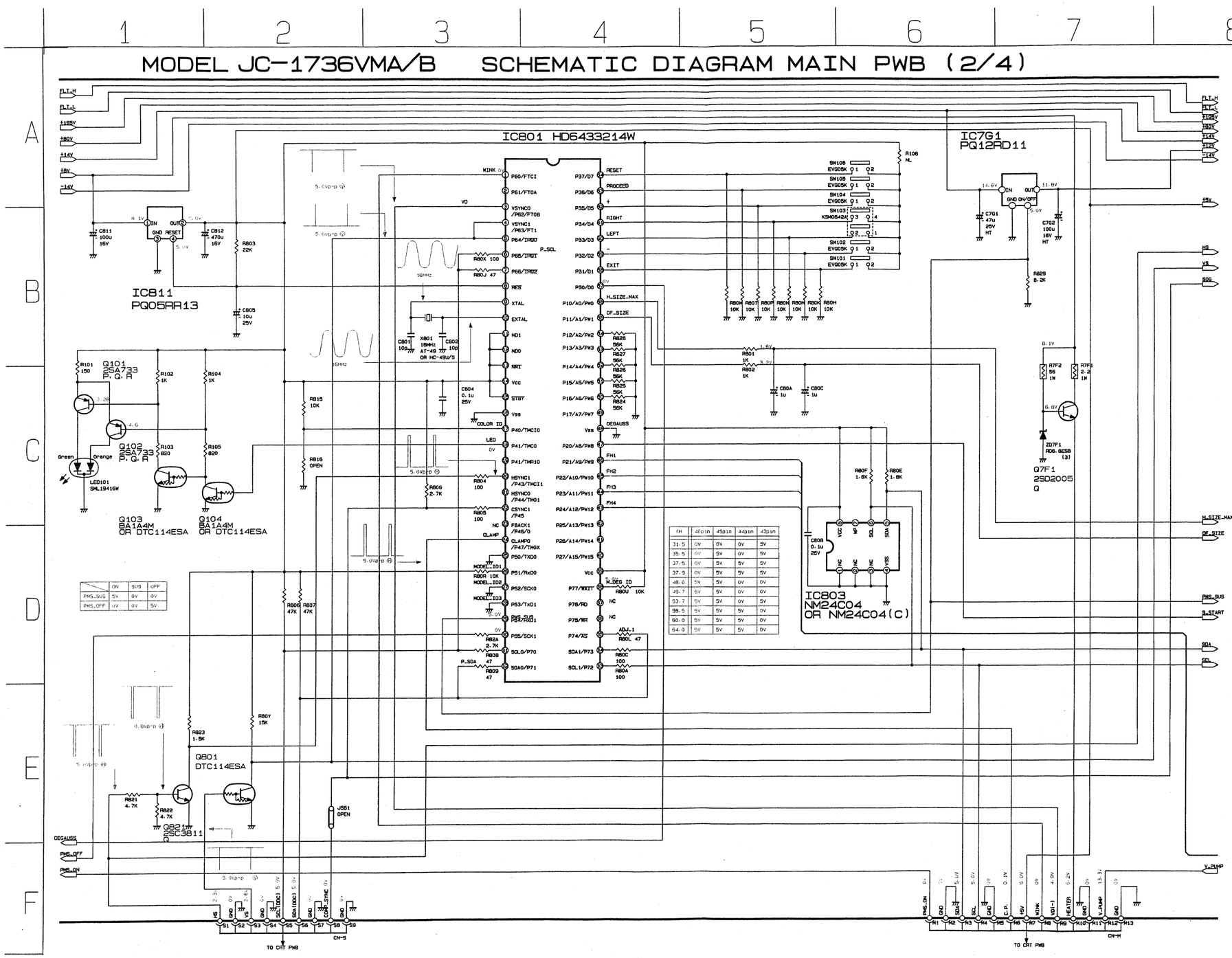
~08109038-E

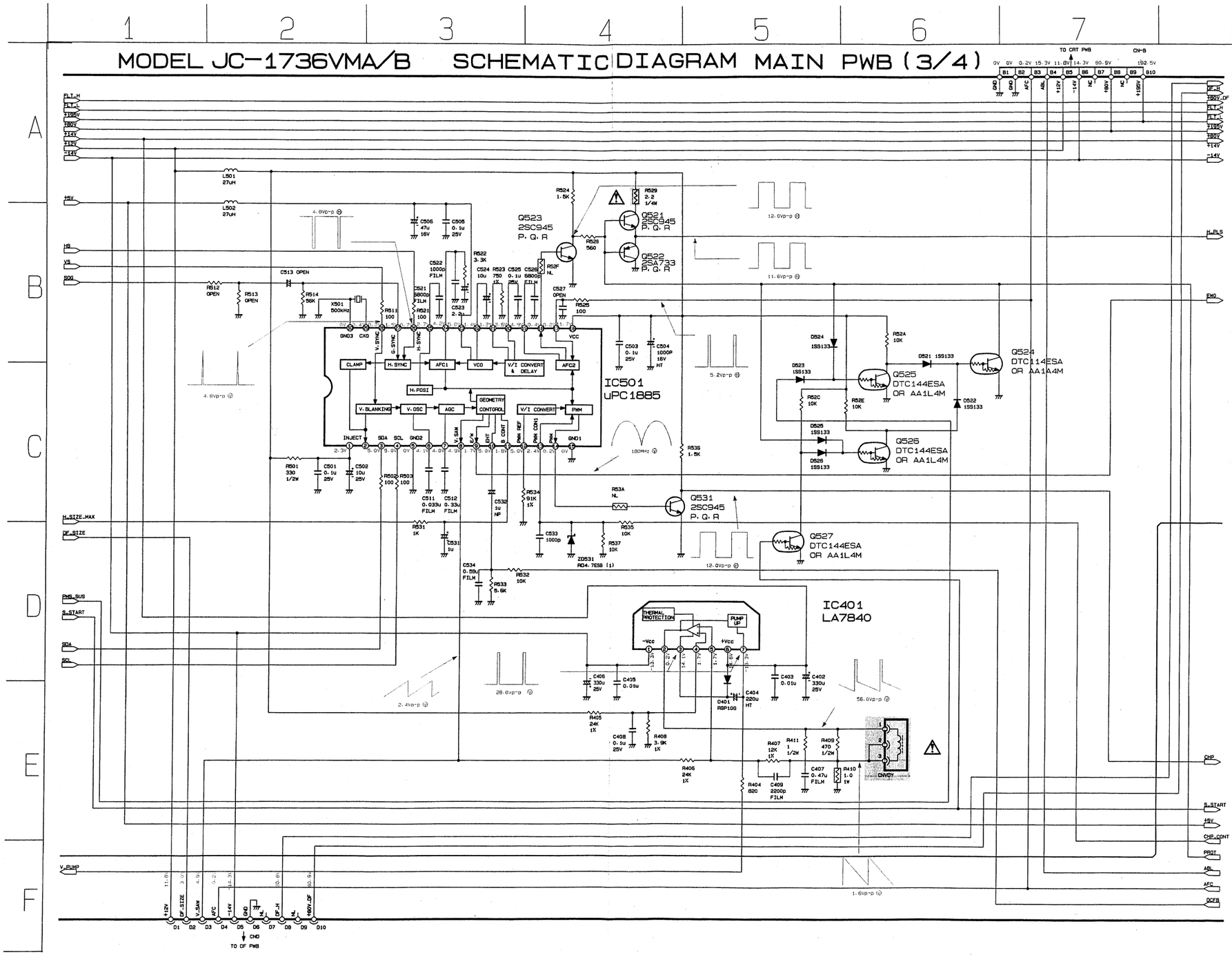
MODEL JC-1736VMA/B SCHEMATIC DIAGRAM MAIN PWB (2/4)



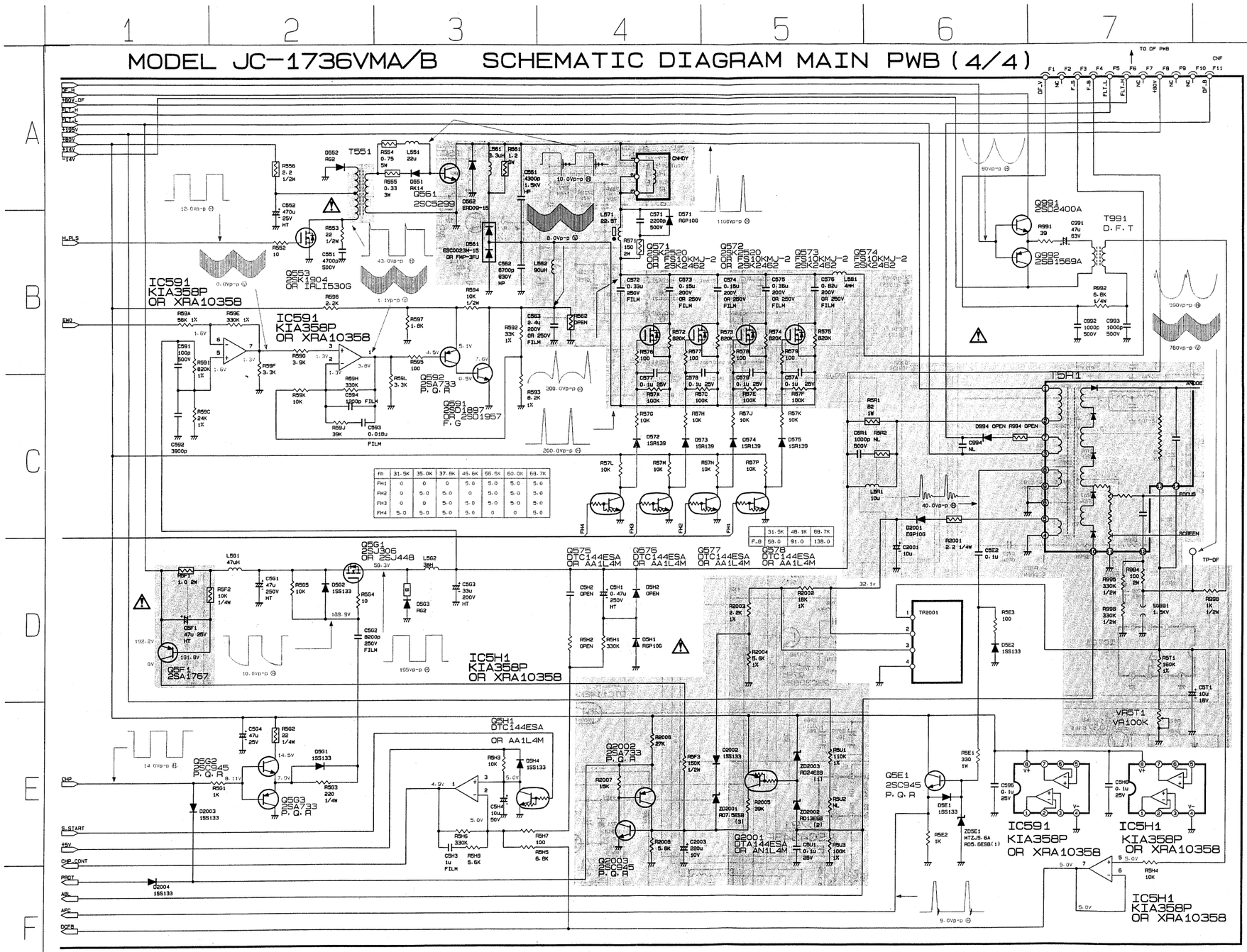
	ON	SUS	OFF
PMS_SUS	5V	0V	0V
PMS_OFF	0V	0V	5V

fH	48pin	45pin	44pin	43pin
31.5	0V	0V	0V	5V
35.5	0V	5V	0V	5V
37.5	0V	5V	5V	5V
37.9	0V	5V	5V	5V
48.0	5V	5V	0V	0V
49.7	5V	5V	0V	0V
53.7	5V	5V	0V	5V
55.5	5V	5V	5V	0V
60.0	5V	5V	5V	0V
64.0	5V	5V	5V	0V

MODEL JC-1736VMA/B SCHEMATIC DIAGRAM MAIN PWB (3/4)



MODEL JC-1736VMA/B SCHEMATIC DIAGRAM MAIN PWB (4/4)



fh	31.5K	35.0K	37.8K	46.6K	56.5K	60.0K	69.7K
FH1	0	0	0	5.0	5.0	5.0	5.0
FH2	0	5.0	5.0	0	5.0	5.0	5.0
FH3	0	0	5.0	5.0	5.0	5.0	5.0
FH4	5.0	5.0	5.0	5.0	0	0	5.0

	31.5K	48.1K	69.7K
F_B	58.0	91.0	138.0

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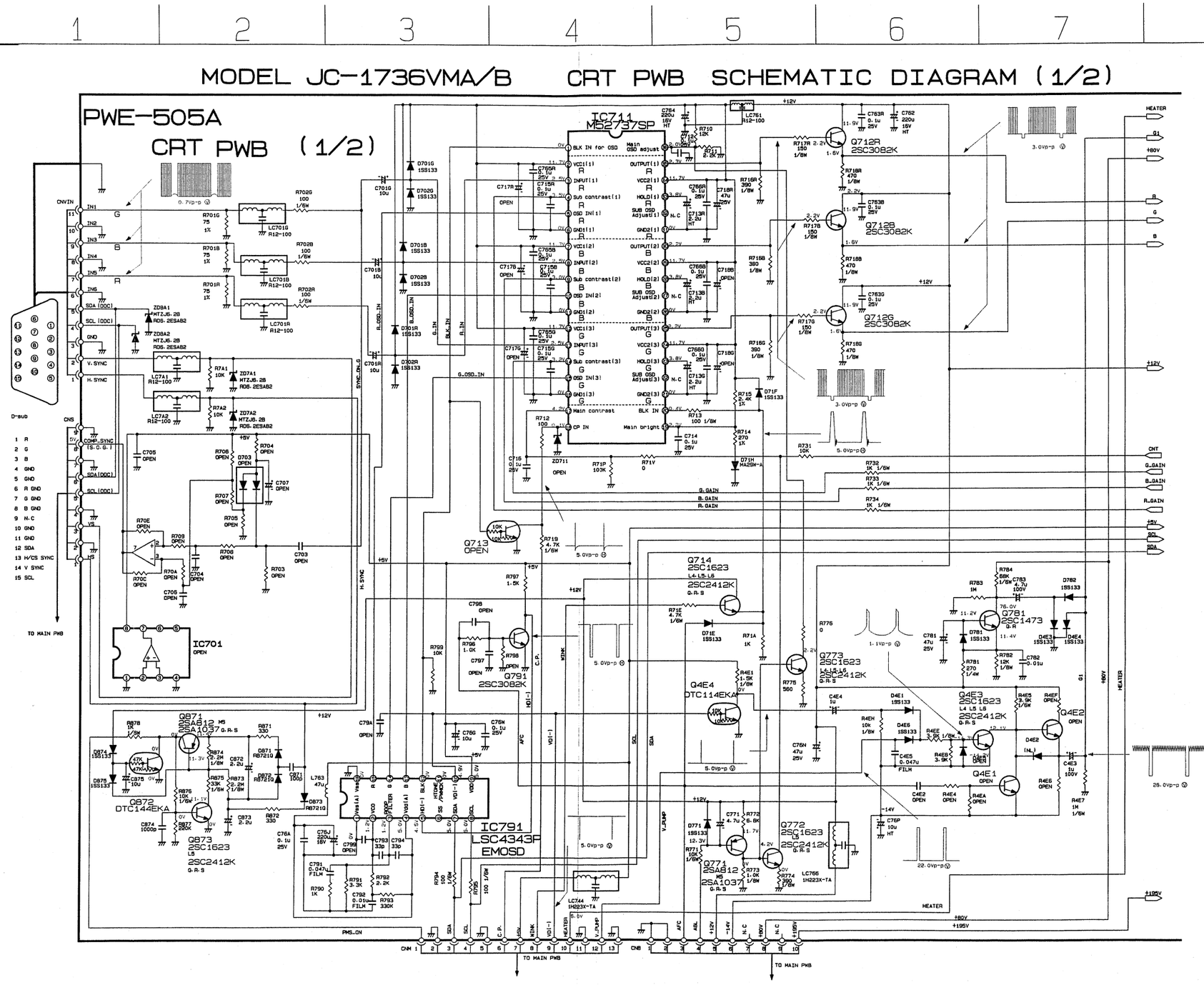
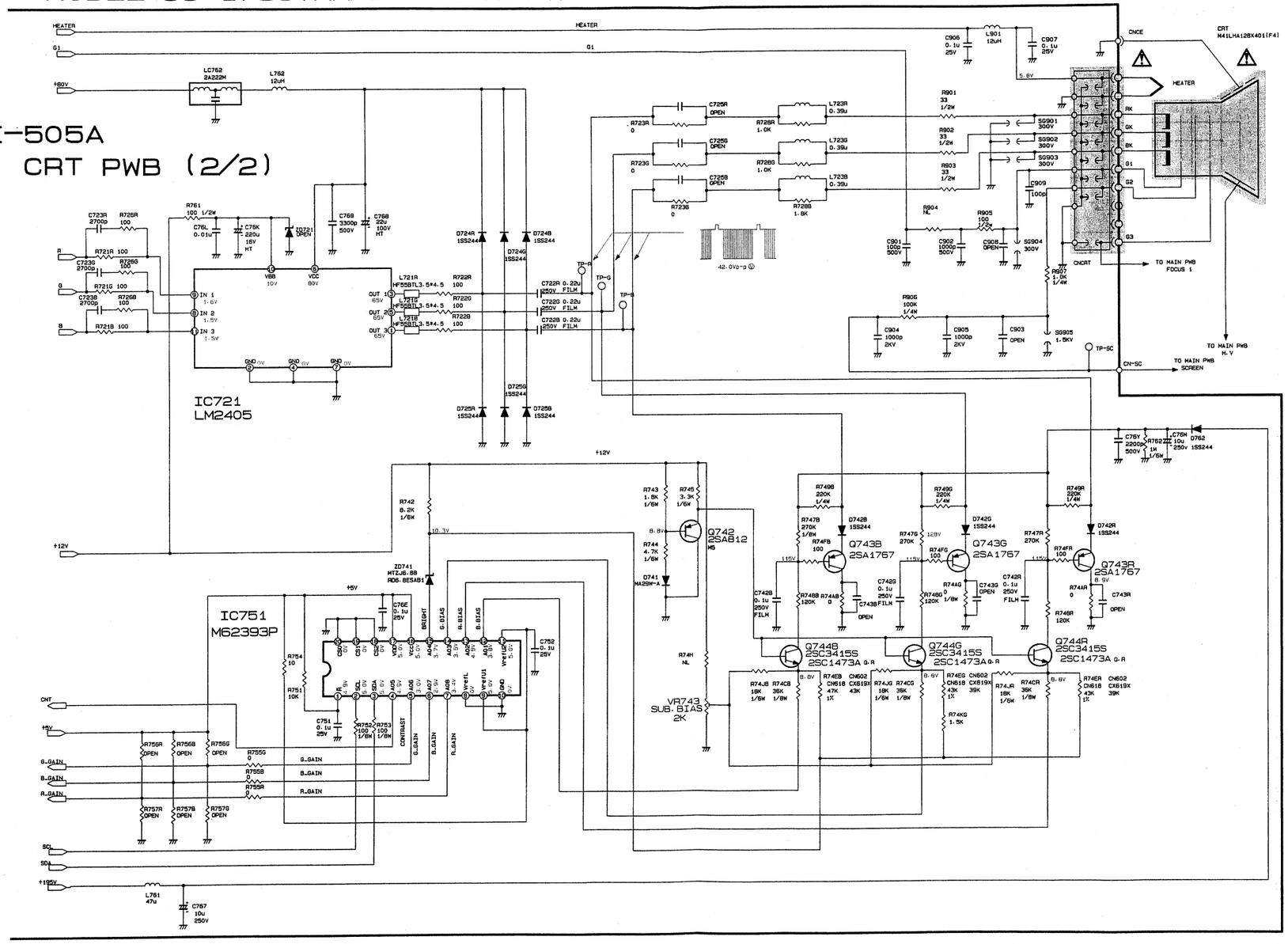
MODEL JC-1736VMA/B CRT PWB SCHEMATIC DIAGRAM (1/2)

PWE-505A
CRT PWB (1/2)



MODEL JC-1736VMA/B CRT PWB SCHEMATIC DIAGRAM (2/2)

PWE-505A
CRT PWB (2/2)



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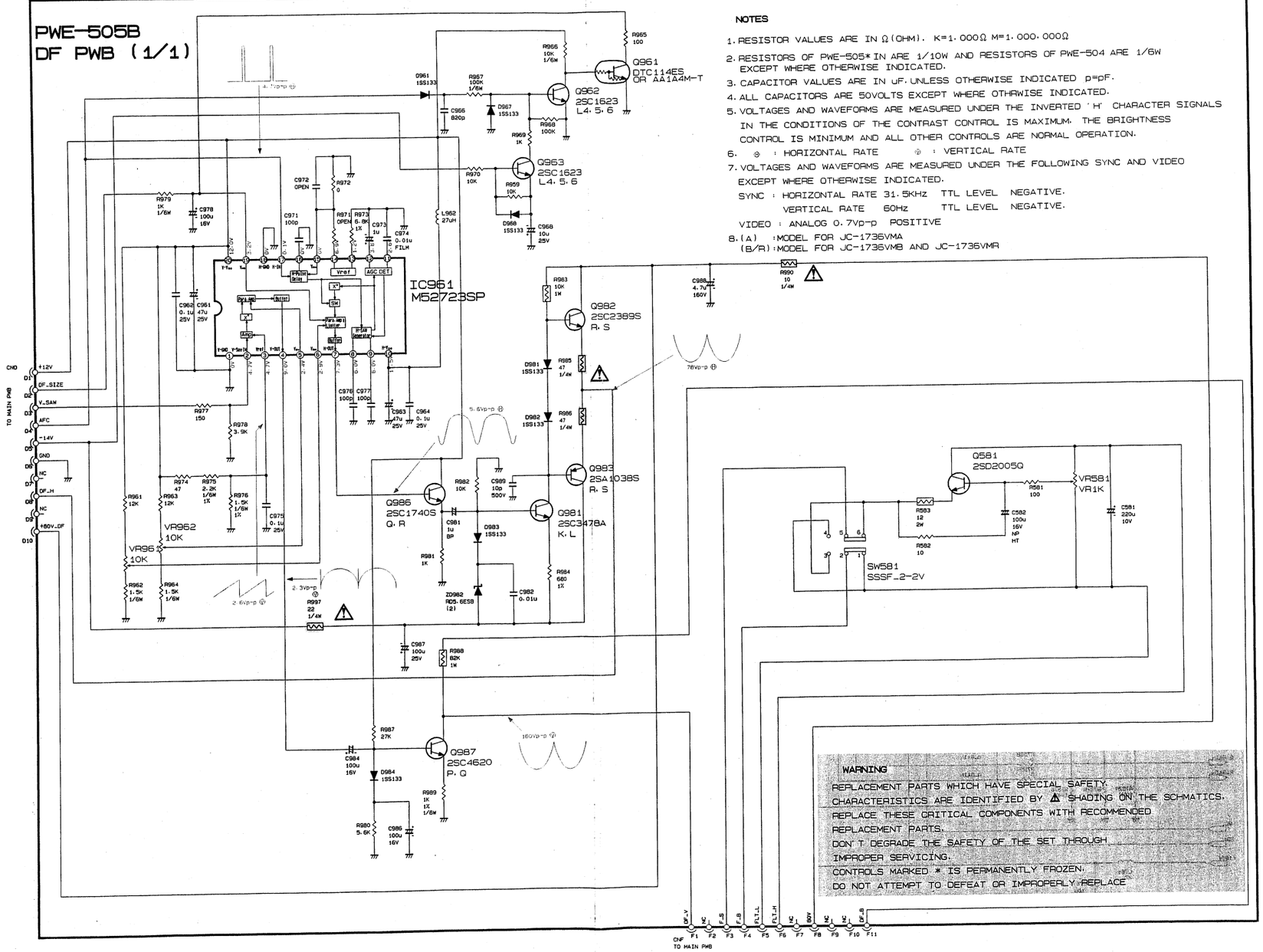
~08109038-E

MODEL JC-1736VMA/B SCHEMATIC DIAGRAM DF PWB (1/1)

PWE-505B
DF PWB (1/1)



NOTES

1. RESISTOR VALUES ARE IN Ω(OHM). K=1.000Ω M=1.000.000Ω
2. RESISTORS OF PWE-505* IN ARE 1/10W AND RESISTORS OF PWE-504 ARE 1/6W EXCEPT WHERE OTHERWISE INDICATED.
3. CAPACITOR VALUES ARE IN uF. UNLESS OTHERWISE INDICATED p=pF.
4. ALL CAPACITORS ARE 50VOLTS EXCEPT WHERE OTHRWISE INDICATED.
5. VOLTAGES AND WAVEFORMS ARE MEASURED UNDER THE INVERTED 'H' CHARACTER SIGNALS IN THE CONDITIONS OF THE CONTRAST CONTROL IS MAXIMUM. THE BRIGHTNESS CONTROL IS MINIMUM AND ALL OTHER CONTROLS ARE NORMAL OPERATION.
6. ⊕ : HORIZONTAL RATE ⓥ : VERTICAL RATE
7. VOLTAGES AND WAVEFORMS ARE MEASURED UNDER THE FOLLOWING SYNC AND VIDEO EXCEPT WHERE OTHERWISE INDICATED.
   SYNC : HORIZONTAL RATE 31.5KHz TTL LEVEL NEGATIVE.
   VERTICAL RATE 60Hz TTL LEVEL NEGATIVE.
   VIDEO : ANALOG 0.7Vp-p POSITIVE
8. (A) :MODEL FOR JC-1736VMA
   (B/R):MODEL FOR JC-1736VMB AND JC-1736VMR

WARNING

REPLACEMENT PARTS WHICH HAVE SPECIAL SAFETY CHARACTERISTICS ARE IDENTIFIED BY ⚠ SHADING ON THE SCHMATICS. REPLACE THESE CRITICAL COMPONENTS WITH RECOMMENDED REPLACEMENT PARTS.
DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.
CONTROLS MARKED * IS PERMANENTLY FROZEN.
DO NOT ATTEMPT TO DEFEAT OR IMPROPERLY REPLACE

08109037-E
~08109038-E

V21586

NEC

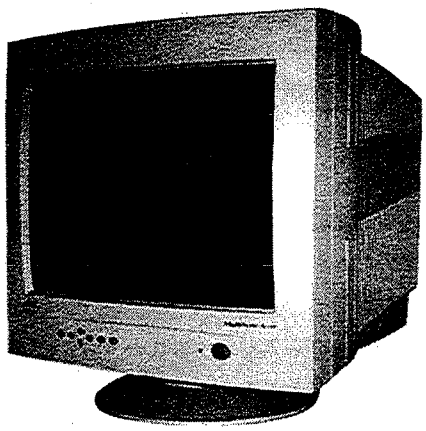
MODEL JC-1736VMB-1

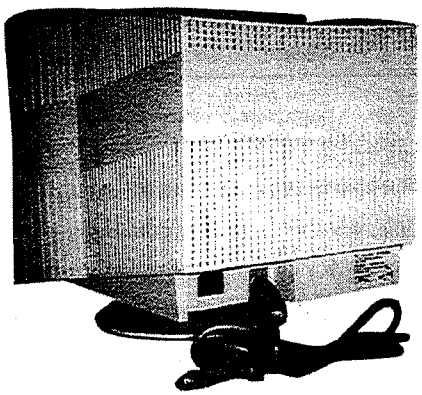
COLOR MONITOR **MultiSync® A700™**

SERVICE MANUAL

PART NO. 599910436

Better Service
Better Reputation
Better Profit





Refer to the Service Manual PART No. 599910423, since this unit is same as JC-1736VMA/B except for the differences on this manual.

NEC Corporation
TOKYO, JAPAN

WARNING

The SERVICE PERSONNEL should have the appropriate technical training, knowledge and experience necessary to:

- Be familiar with specialized test equipment, and
- Be careful to follow all safety procedures associated with high voltage CRT circuit designs to minimize danger to themselves and their coworkers.

To avoid electrical shocks, this equipment should be used with an appropriate power cord and be connected only to a properly grounded AC outlet.

This equipment utilized a micro-gap power switch. Turn off the set by first pushing the front panel power switch. Next, remove the power cord from the AC outlet.

To prevent fire or shock hazards, do not expose this unit to rain or moisture.

This symbol warns the personnel that un-insulated voltage within the unit may have sufficient magnitude to cause electric shock.

This symbol alerts the personnel that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

PRODUCT SAFETY CAUTION

1. When parts replacement is required for servicing, always use the manufacturer's specified replacement.
2. Comply with all caution and safety-related notes on the product display chassis and picture tube.
3. When replacing the component, always be certain that all the components are put back in the place.
4. When servicing display monitor unit, it is required that the provided lead dress is used in the high voltage circuit area.
5. It is also recommended that shatter proof goggles are worn, when removing installing and handling the picture tube. People not equipped with the proper precautionary measures mentioned should keep the picture tube away from body while handling.
6. X-radiation precaution

   This product contains critical electrical and mechanical parts essential for X-ray protection.
   Normal anode voltage is 25.0 kV at zero beam picture tube current under AC 220-240 V input, and anode voltage must not exceed the voltages shown below under any operation condition. To measure anode voltage set brightness for very dim picture, and use a high impedance volt meter between chassis and anode lead and measure high voltage. If high voltage exceeds the specifications on the chassis schematic diagram, take the necessary corrective action.

Table MAXIMUM ANODE VOLTAGE

beam current	at 0 mA	at 0.5 mA	at 1.0 mA
B-1 ver	32.3 kV	31.4 kV	31.0 kV

7. As for a connector, pick and extract housing with fingers properly since a disconnection and improper contacts may occur, when wires of the connector are led.
8. Use a proper screwdriver. If you use screwdriver that does not fit, you may damage the screws.

This model is modified model of JC-1736VMB.
Please refer to the Service Manual models JC-1736VMA/B, PART No. 599910423 except for the differences on this manual.

1. ADJUSTMENT PROCEDURES

9-1. Gain Adjustment Signal : No. 23 (VESA 800*600@75Hz(Window) Window Pattern

(1) Receive the signal 23.

(2) Adjust brightness by SCREEN VR so that OSM menu appears.

(3) Open Menu(S), TAB 5 "MAX / MIN" and set to MAX. Open Menu(S), TAB 5 "COL SELECT" and set to "VPP" with "-" key. Open Menu(S), TAB 4 "BRIGHTNESS" and set the value to 128. If raster appears, adjust SUB BIAS (VR743) on the CRT PWB so that raster disappears.

(4) Open Menu(S), TAB 5 "R GAIN" / "G GAIN" / "B GAIN" and adjust "+", "-" SW so that TP-R / TP-G / TP-B on the CRT PWB is set to **40Vp-p +1/-0Vp-p**.
(Do not include clamp pulse. Refer to Fig 9-1.)
Note : Press the "PROCEED" SW to hide OSM, while performing this adjustment.

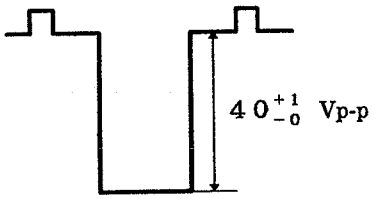


Fig 9-1 Video Amplitude (MAX)

(5) Close menu.

9-3. Brightness Max Adjustment Signal : No. 23 (VESA 800*600@75Hz(Window) all black

(1) Receive Signal 23.

(2) Set modes x, y, Y at the color analyzer.

(3) Open Menu(S), TAB 5 "MAX / MIN" and push "+" SW. (BRIGHTNESS : minimum.)
Open Menu(S), TAB 4 "CEN / MAX / MIN" and set to max.

(4) Open Menu(S), TAB 4 "BRIGHTNESS MAX" and adjust Y so that its analyzer indicated value is 4.5 ± 0.5 cd/㎡.

2. PARTS DIFFERENCE LIST

PARTS DIFFERENCE LIST BETWEEN JC-1736VMB AND JC-1736VMB-1

	JC-1736VMB		JC-1736VMB-1	
SYMBOL	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
	2X834201	CARTON BOX(CN618B)	2X834581	CARTON BOX
	2X785661	NAME PLATE,INSTRUCTION	2X786451	NAME PLATE,INSTRUCTION
	———	———	2X786461	LABEL(ESUCACHEON)
	———	———	2X786161	LABEL(TCO95)
CRT	33017581	CRT M41LHA128X401(F4)	33017582	CRT M41LHA527X401(F4)

NEC

C&C for Human Potential

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7.0MI9709
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